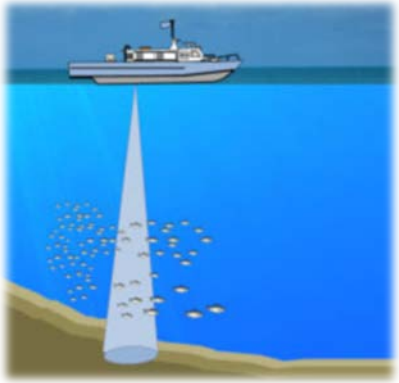
The 2016 Lake Huron Prey Fish Assessment



Timothy O'Brien and Darryl Hondorp

Stephen Riley, Edward Roseman, Peter Esselman,
Margret Chriscinske

Importance of prey fish to the Great Lakes

- food for economically-valuable piscivores
- part of healthy Great Lakes ecosystems
- represent opportunities for commercial fisheries

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U.S. Geological Survey Prey Fish Assessments

- **Purpose:** describe trends in relative abundance and species composition
- **Two surveys:** bottom trawl and acoustic - m.w. trawl
  - different habitats
  - different survey areas/time periods
    - acoustics = whole lake (1997, 2004-2016)
    - trawl = main basin only (1976-2016)
- Survey results are **<u>complementary</u>**

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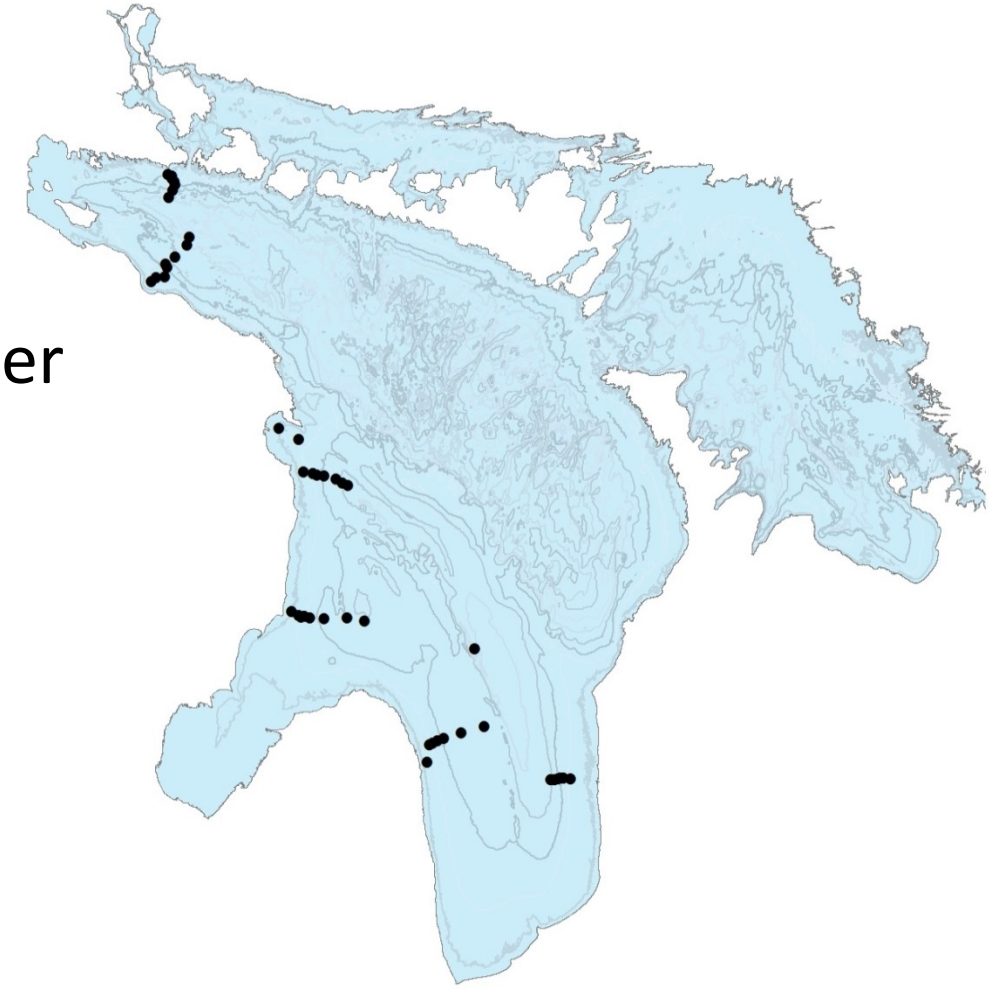
Bottom Trawl Assessment

- 72’ Bottom Trawl
- Completed 19-31 October
- 6 Ports
- 9-110 m stations



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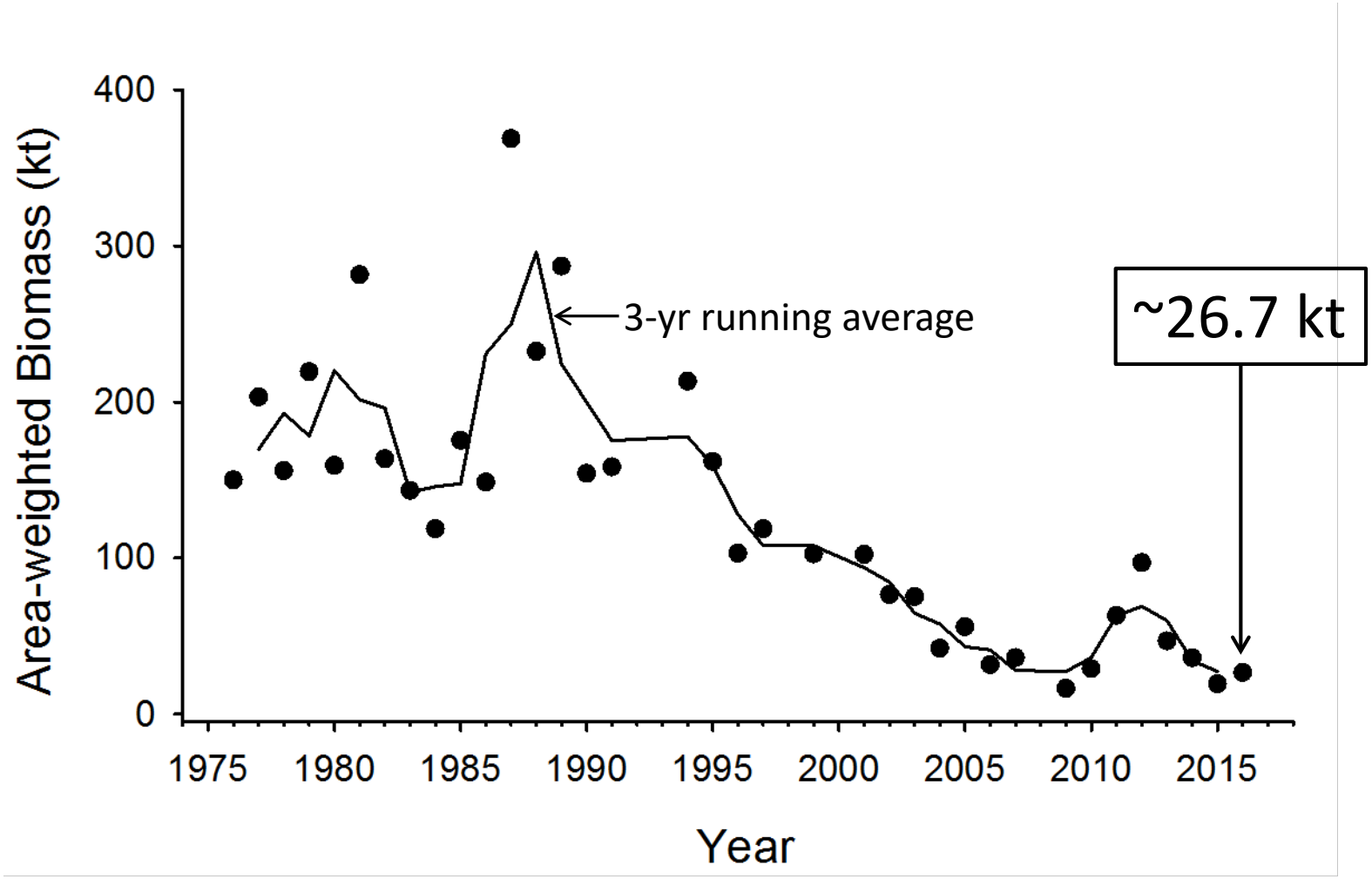
Prey fish biomass in 2016 remained low relative to pre-1995 levels



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Potential causes of low prey fish biomass

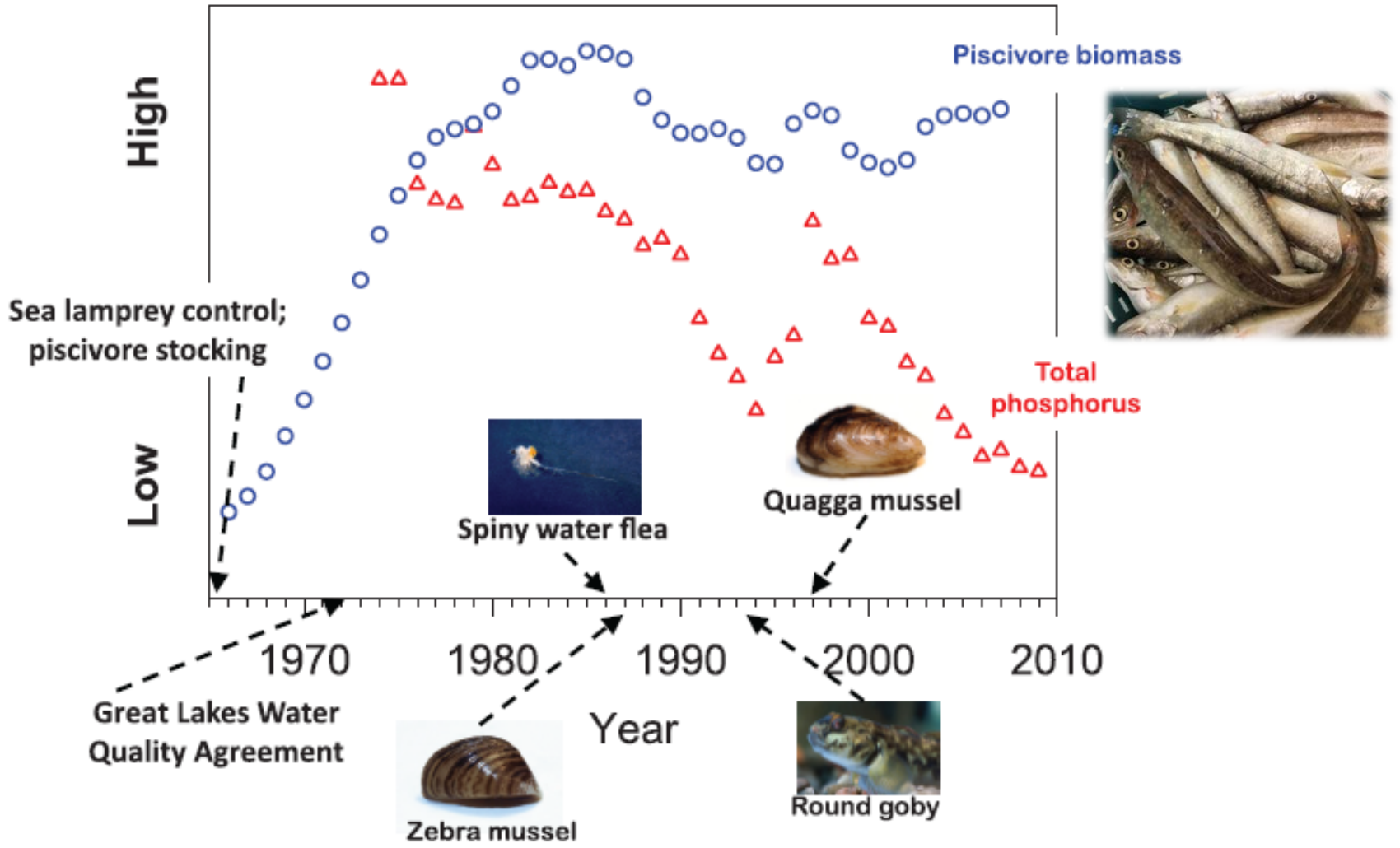

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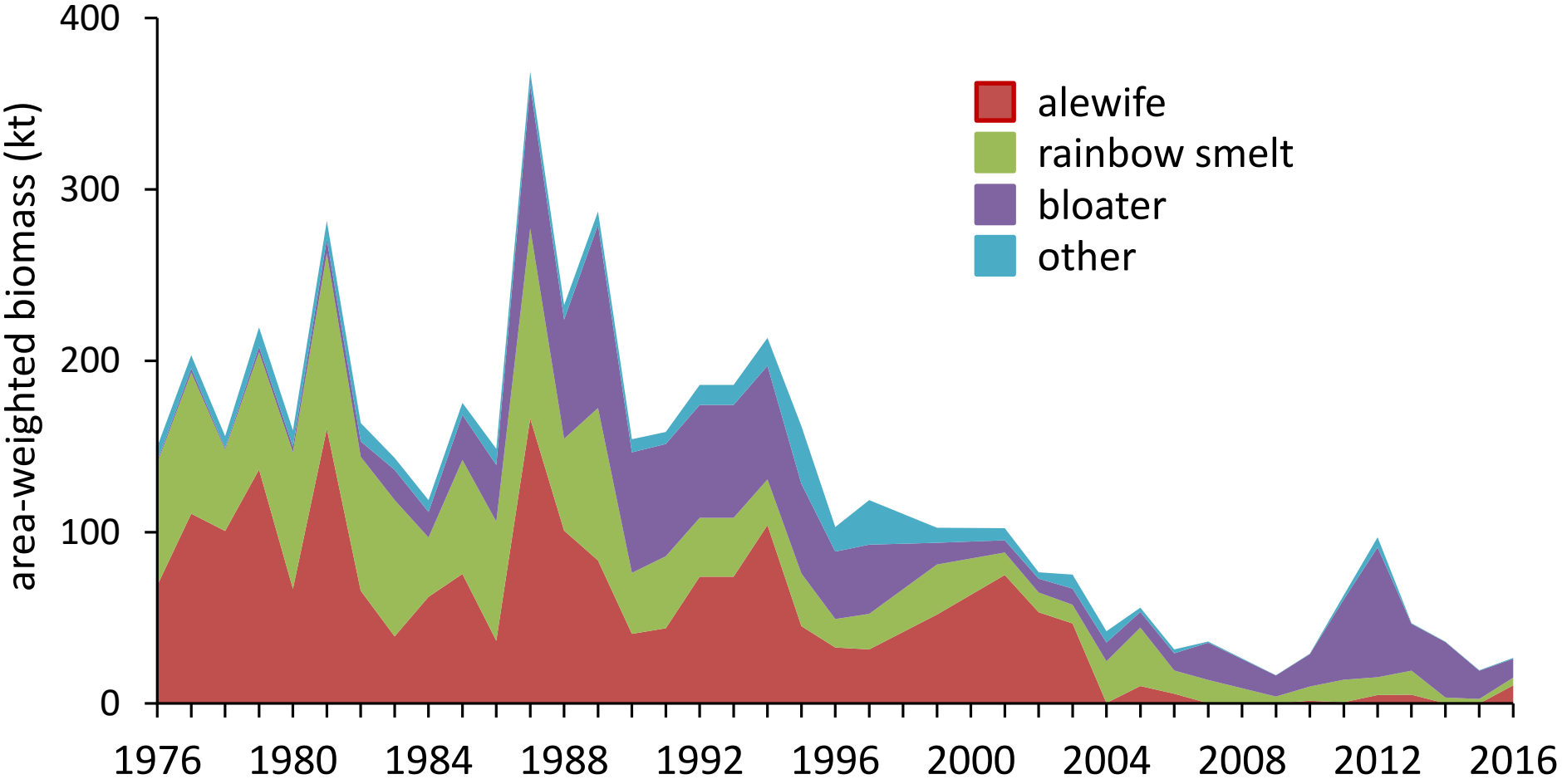
Fig. 2 (Bunnell et al. 2014; *Bioscience*)

Prey fish biomass dominated by three species



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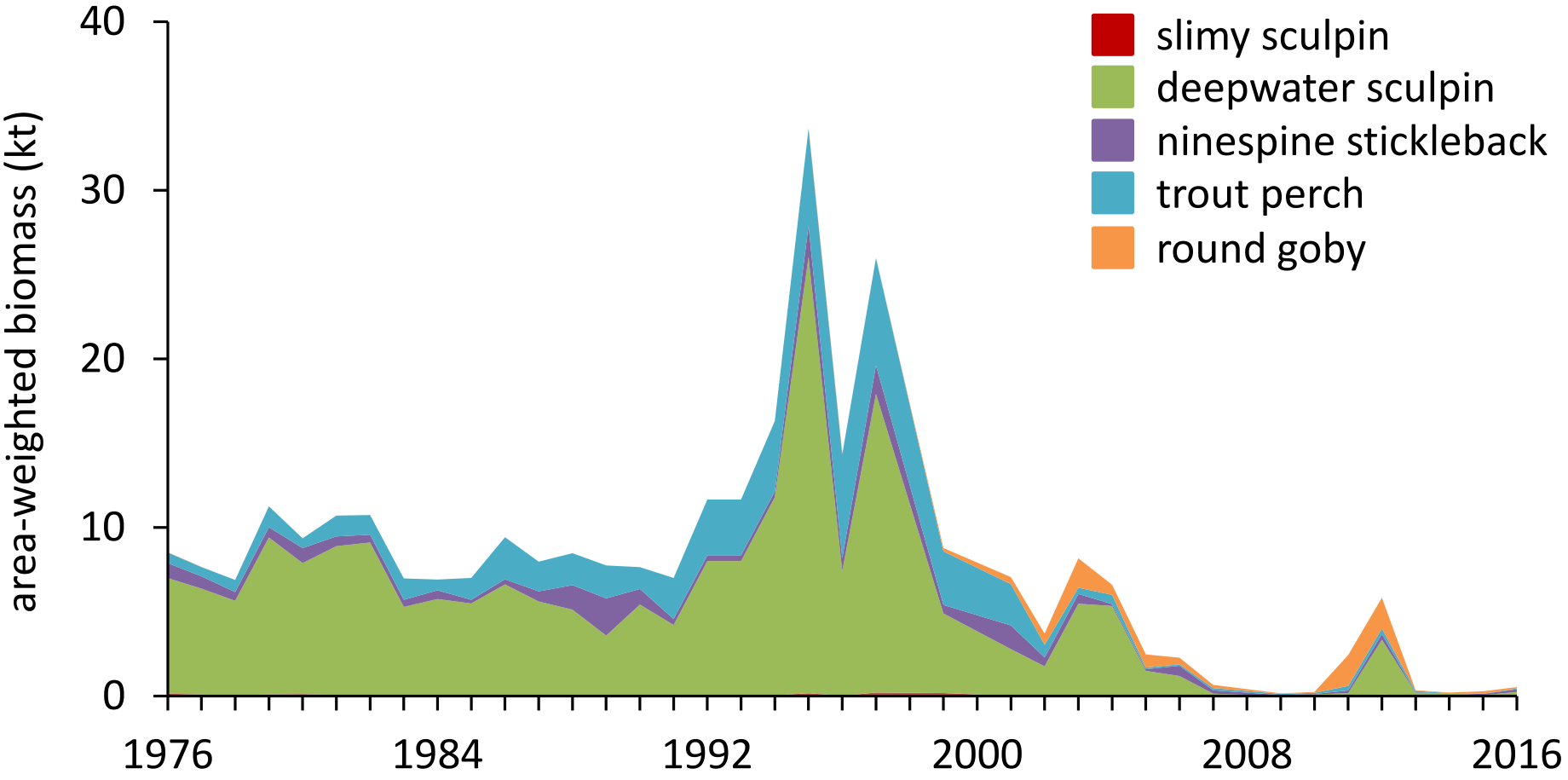
Biomass of “other” species dominated by deepwater sculpin



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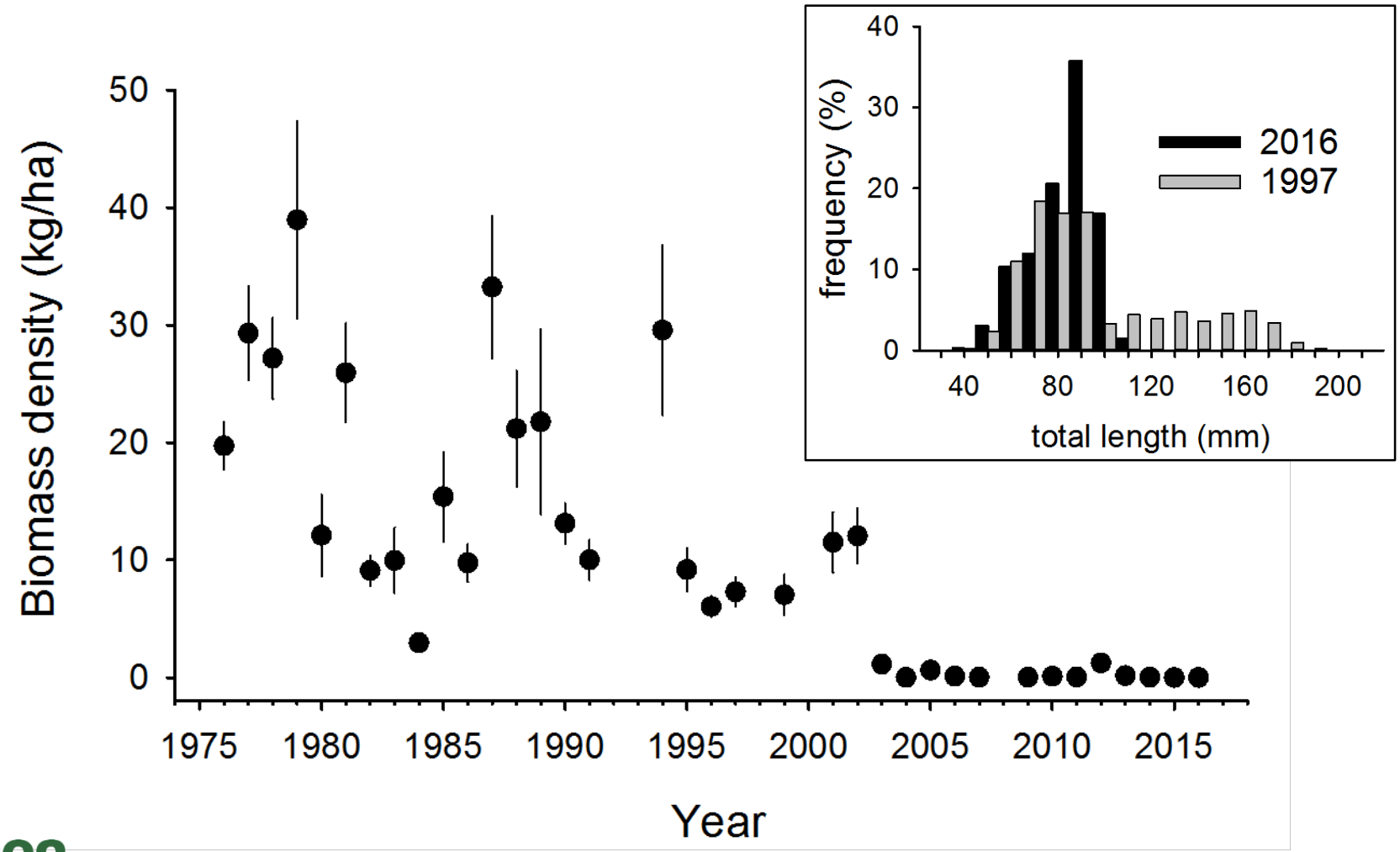
Biomass of yearling and older alewife remains at historically low levels



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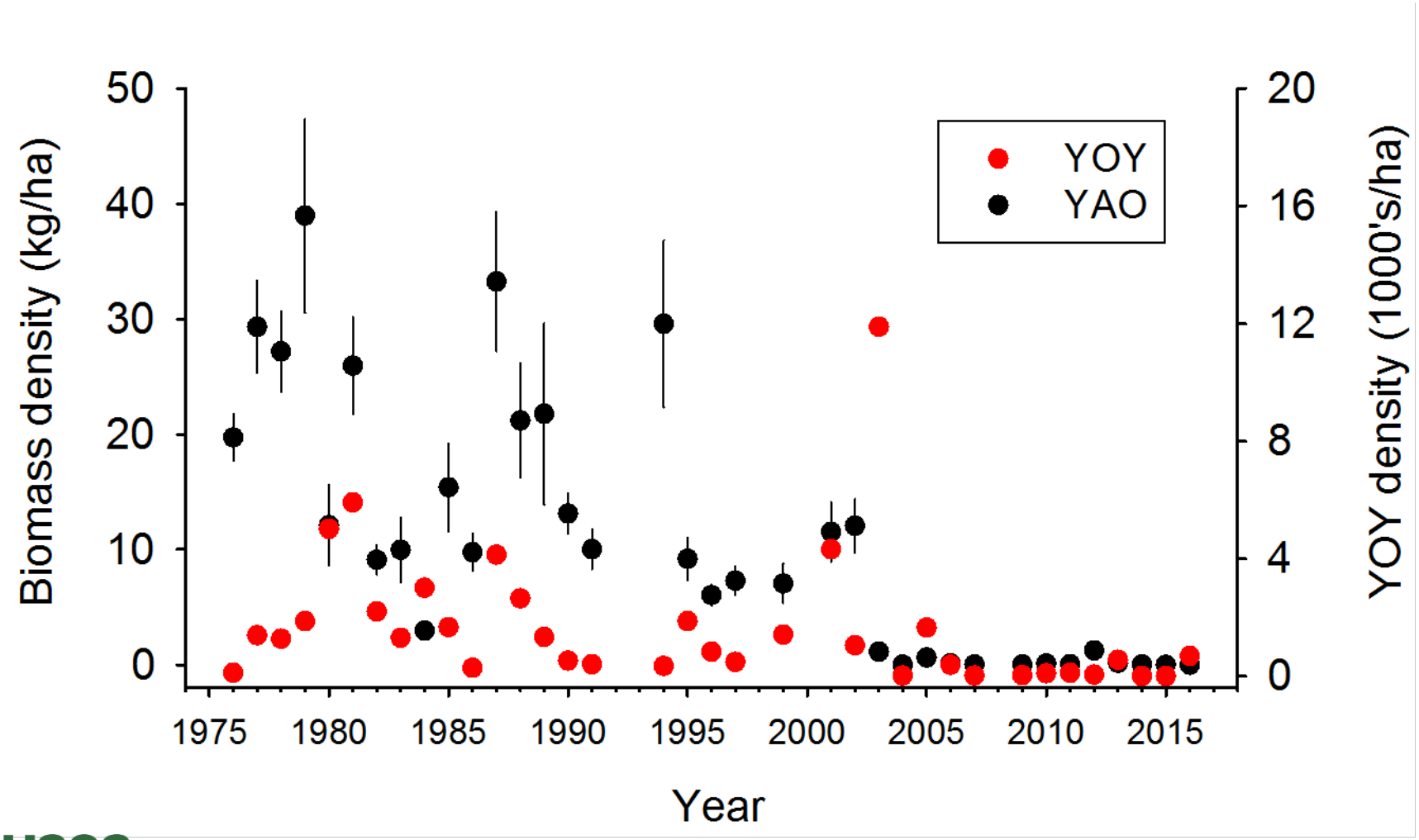
Low alewife biomass associated with poor recruitment



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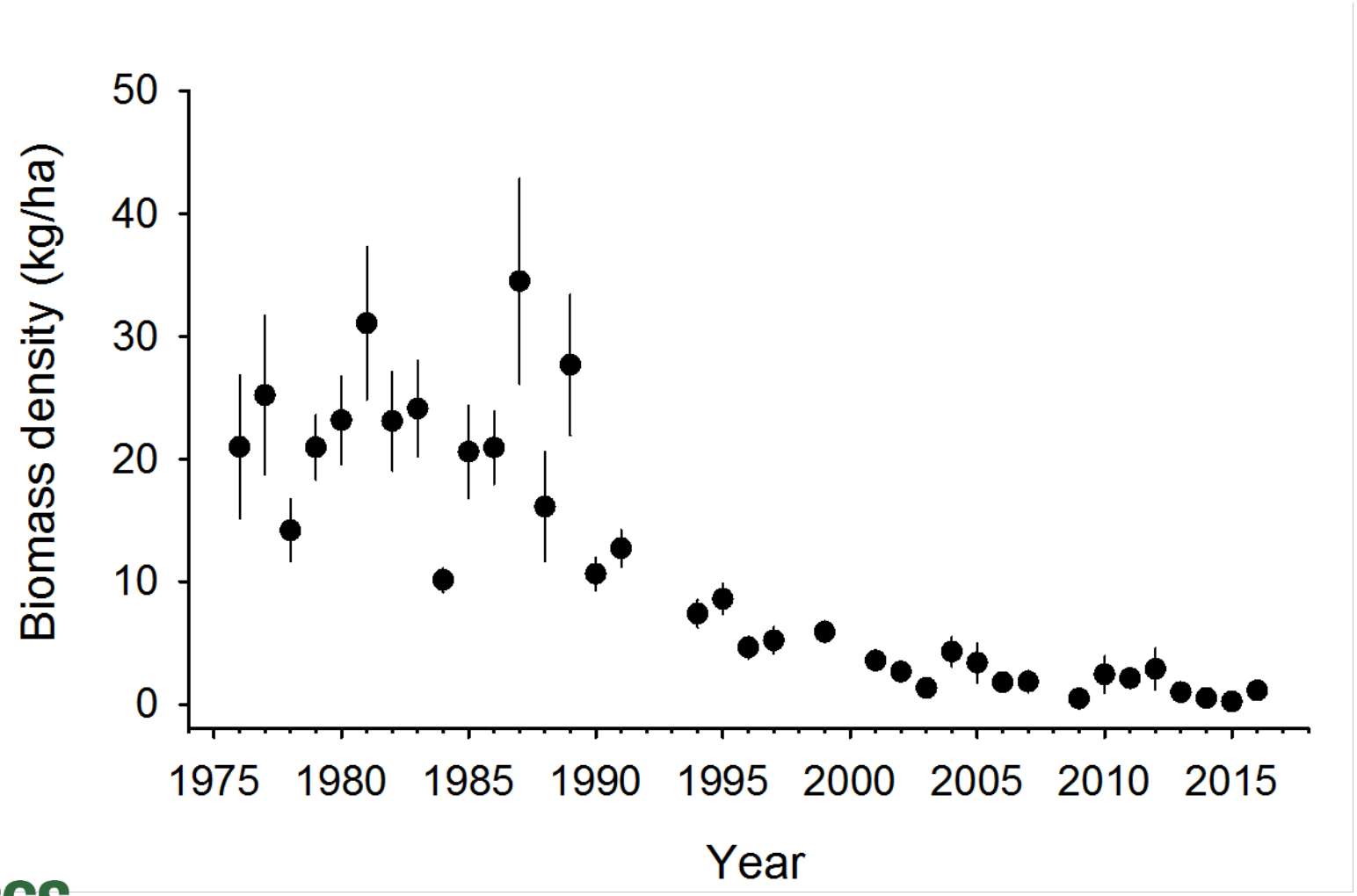
Biomass of yearling and older rainbow smelt remains at historically low levels



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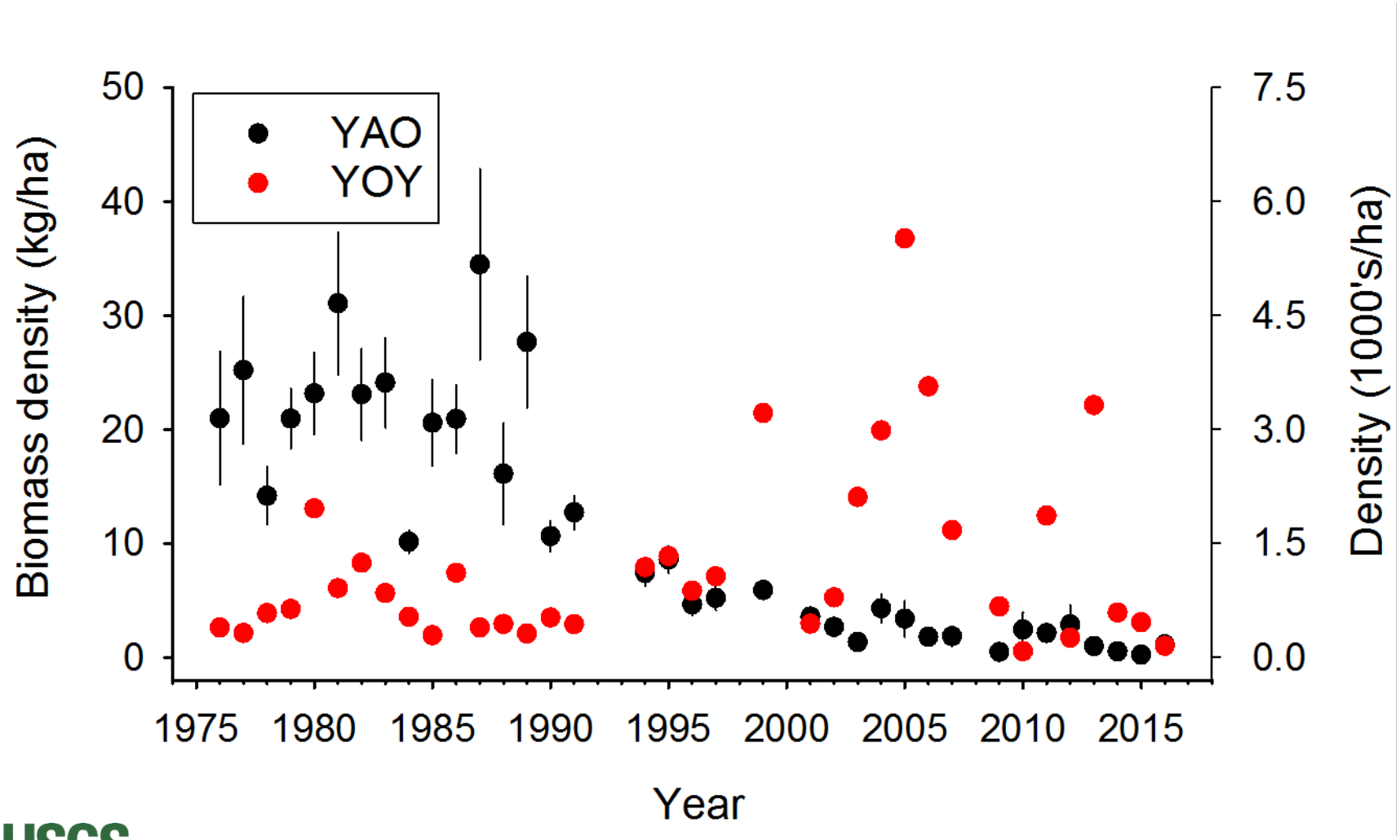
Current low biomass of YAO rainbow smelt not attributable to poor recruitment



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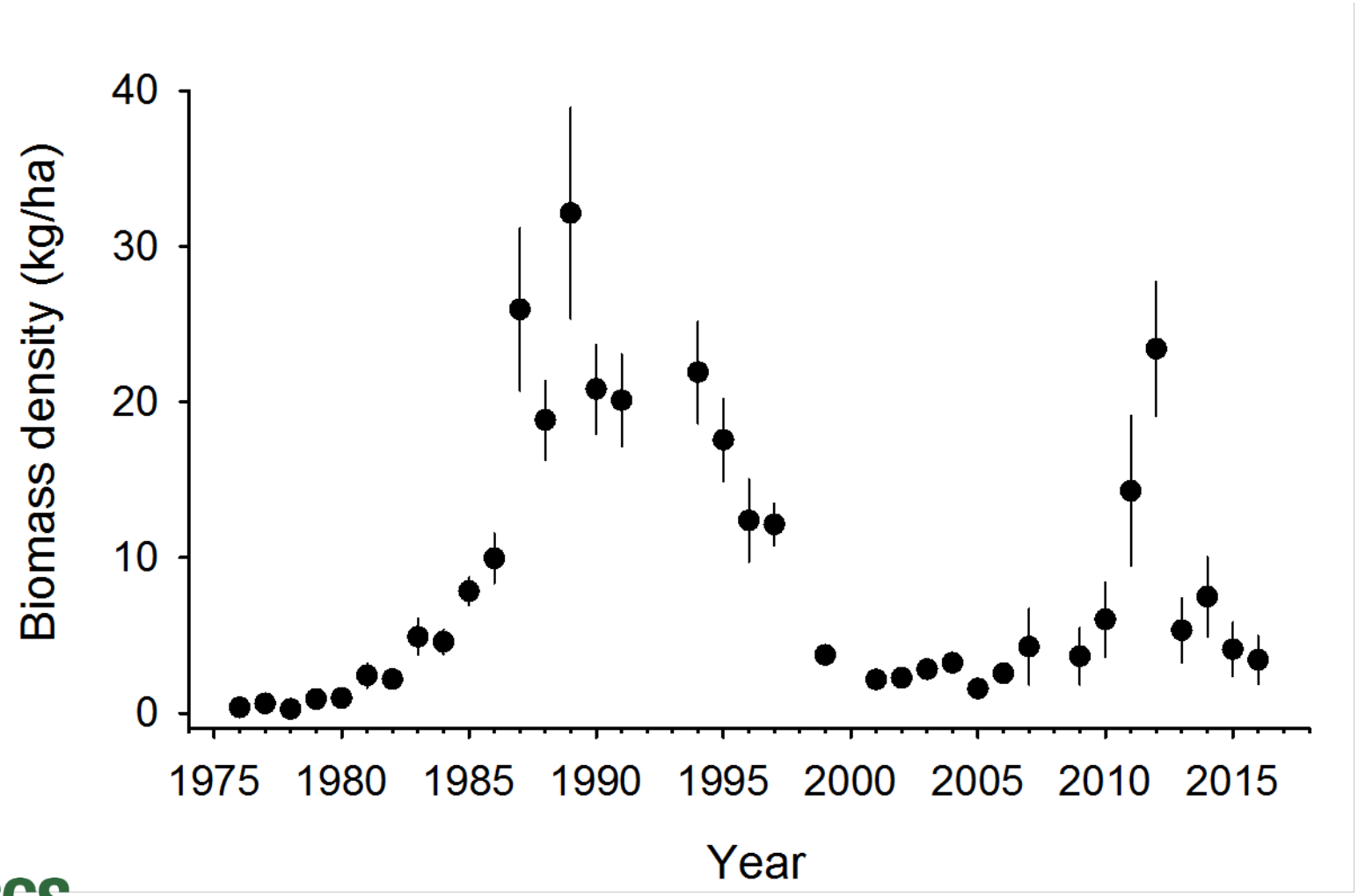
Biomass of yearling and older bloater declining from 2012 peak



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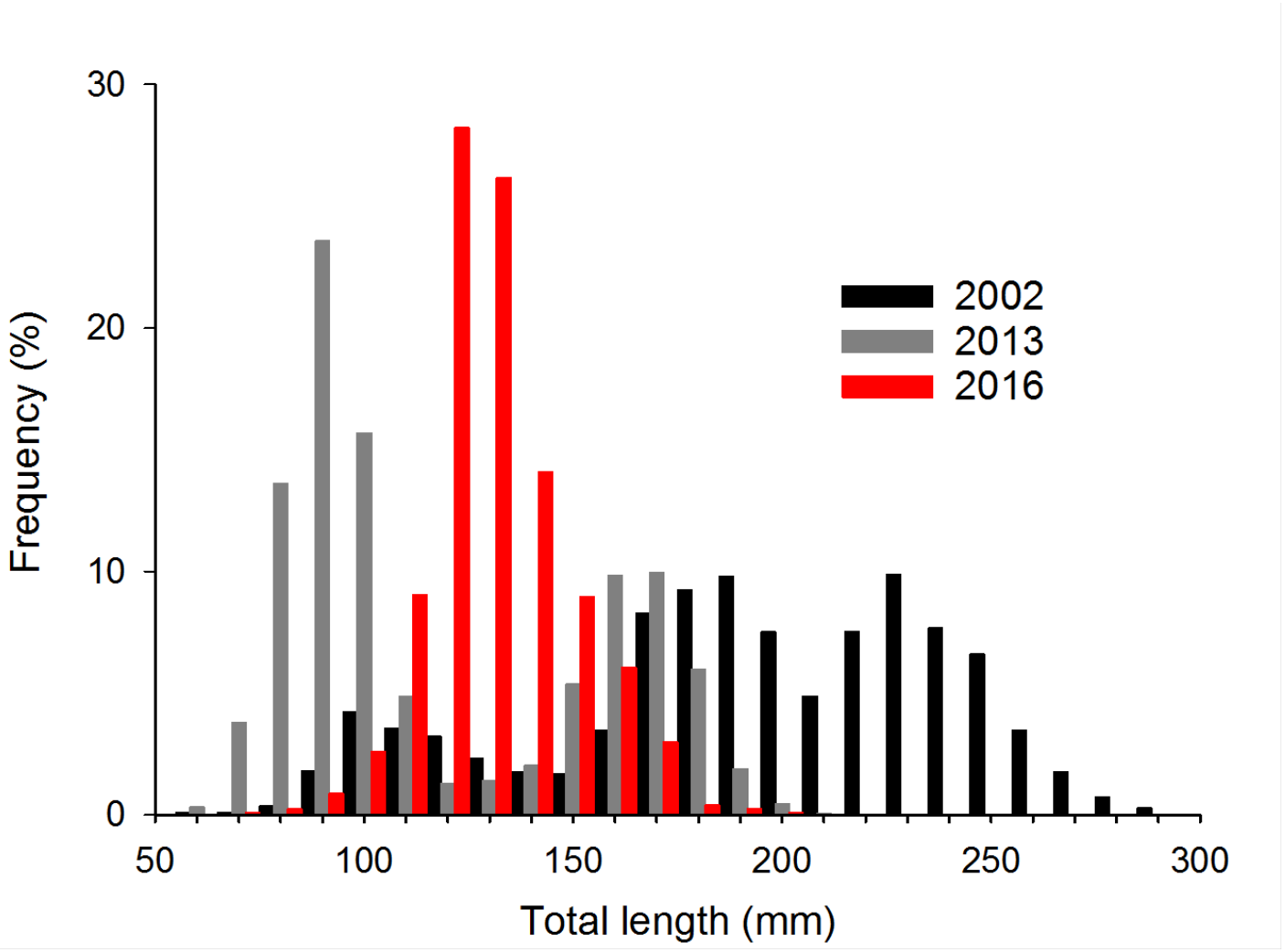
Few large (200+ mm) bloater caught in 2016



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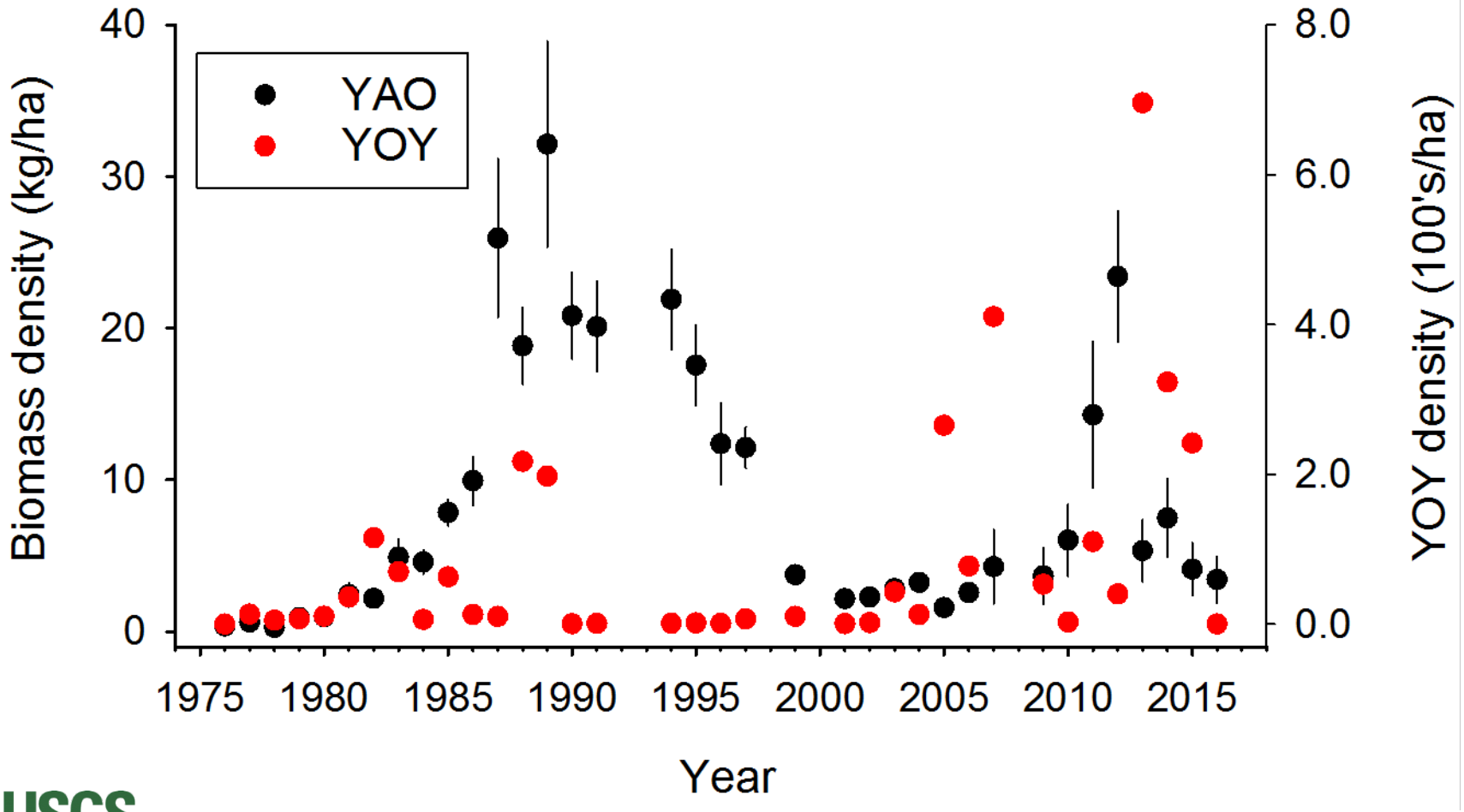
2016 bloater year class weak relative to 2013-2015



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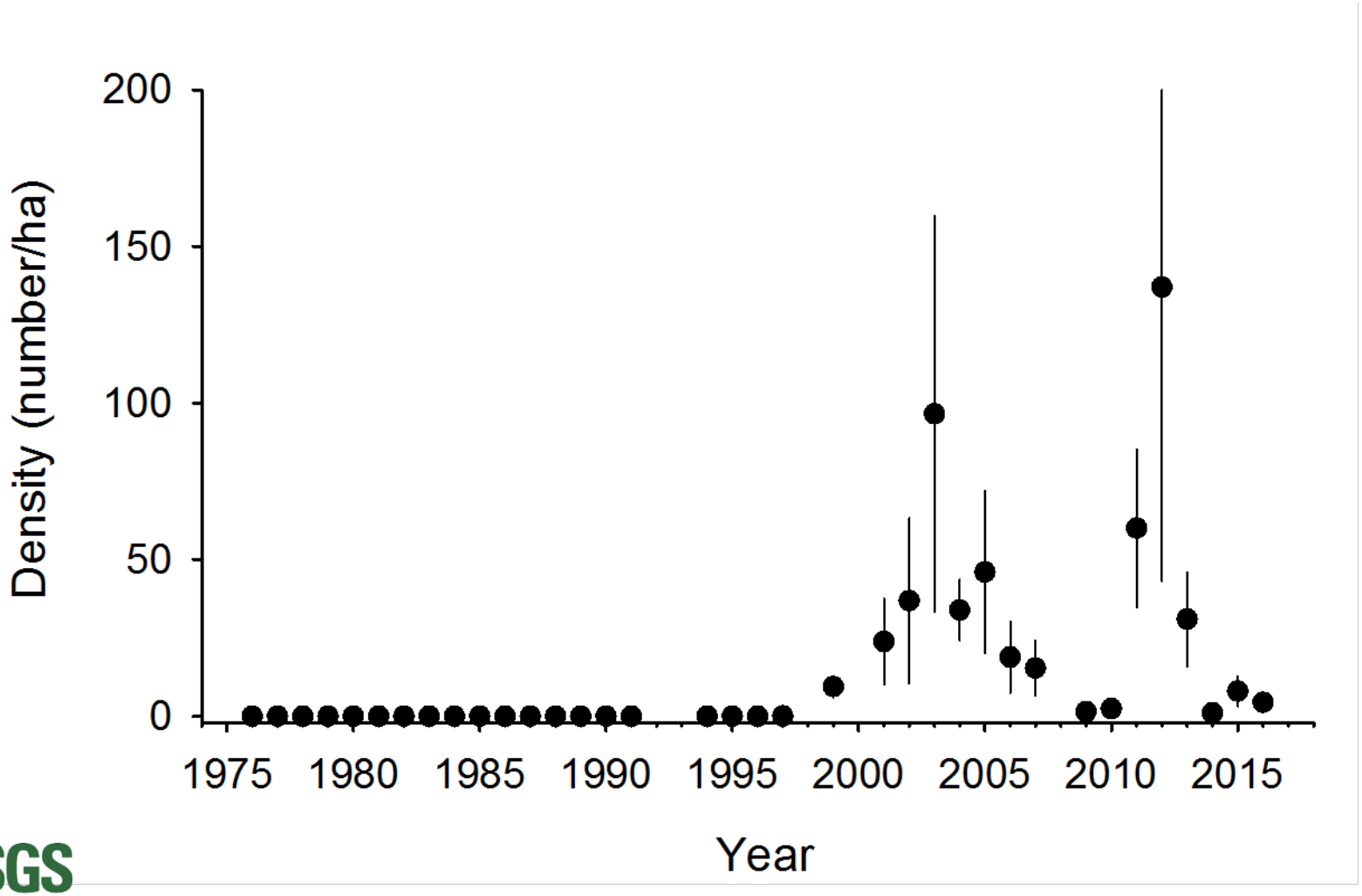
Catches of round goby below post-invasion peak(s)



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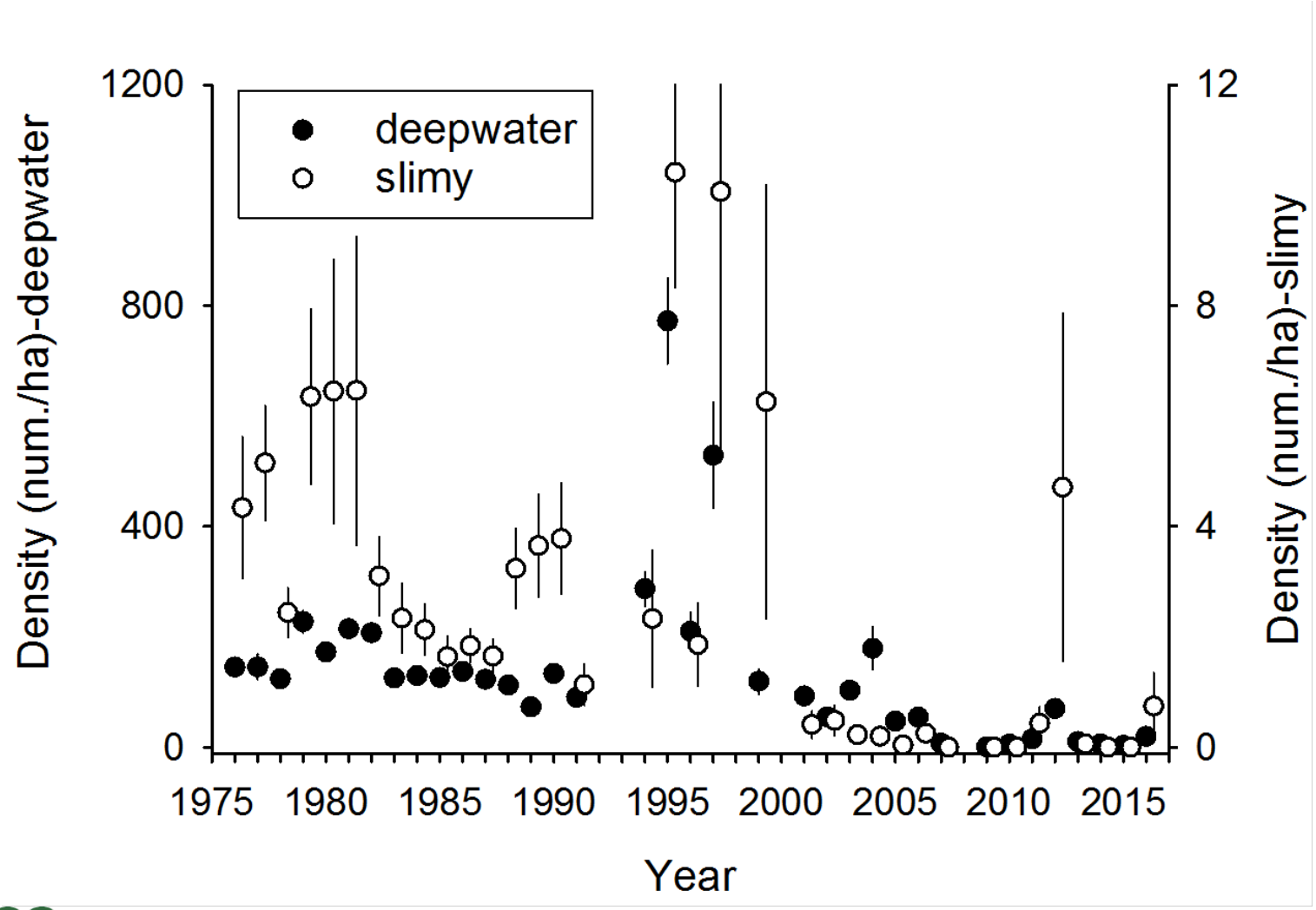
Sculpin catches low relative to pre-2005 levels



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USGS Acoustic Survey

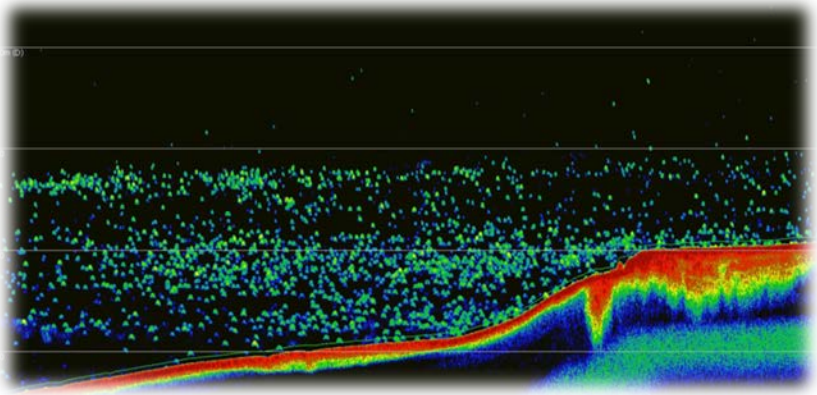
T.P. O'Brien, P. Esselman, P. Armenio, S. Farha – USGS Great Lakes Science Center

S. Lenart, C. Olds – USFWS Alpena FWCO

Great Lakes Fishery Commission, Lake Huron Committee Meeting, March 21, 2017

Synopsis of 2016 survey

- Vessels - R/V Sturgeon & M/V Spencer Baird
- Survey completed in 27 days (7 September - 3 October)
- 26 acoustic transects – 480 km of acoustic effort
- Multi-frequency split-beam acoustics (38, 70, 120 kHz)
- 45 mid-water trawl tows



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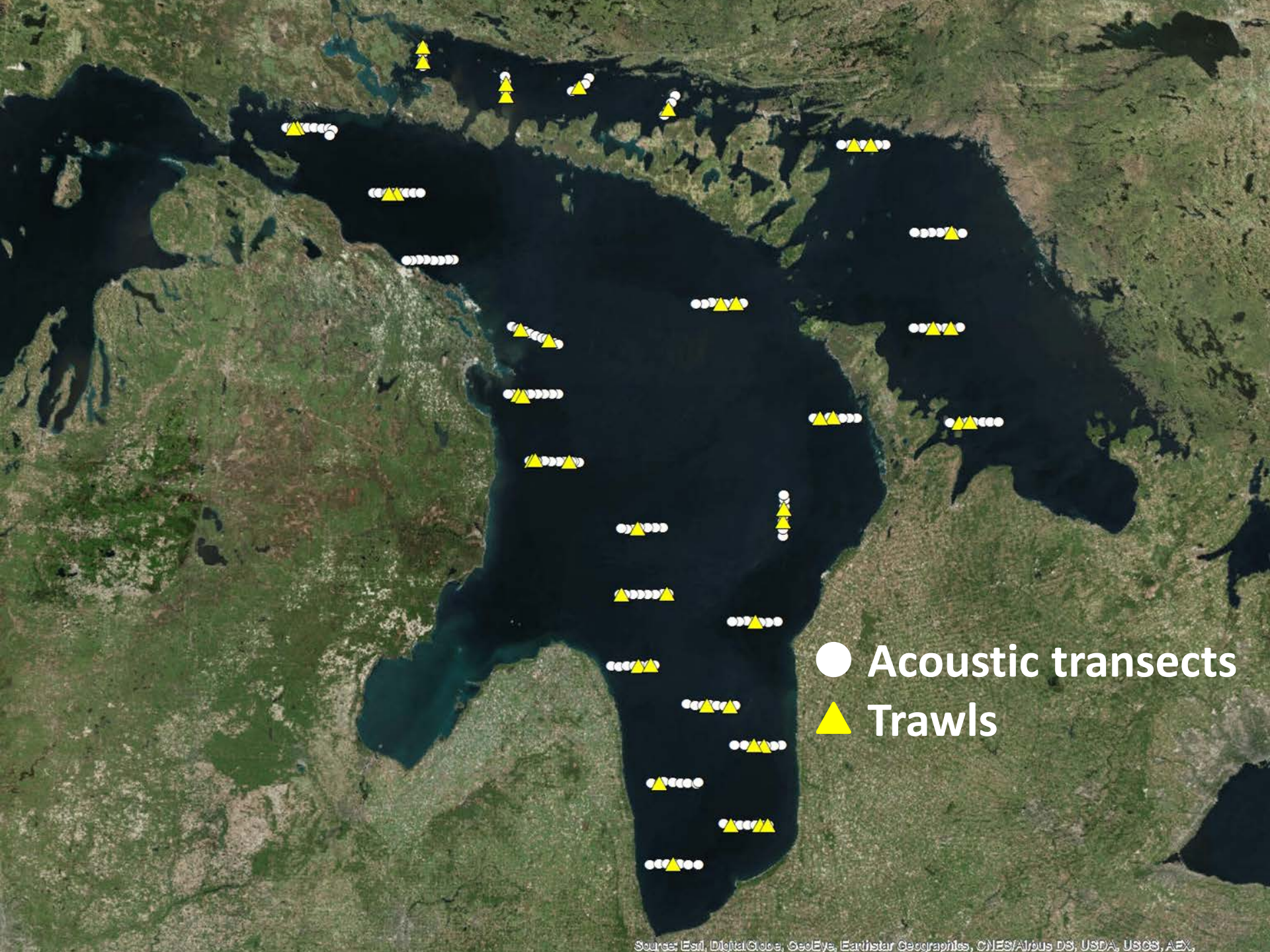
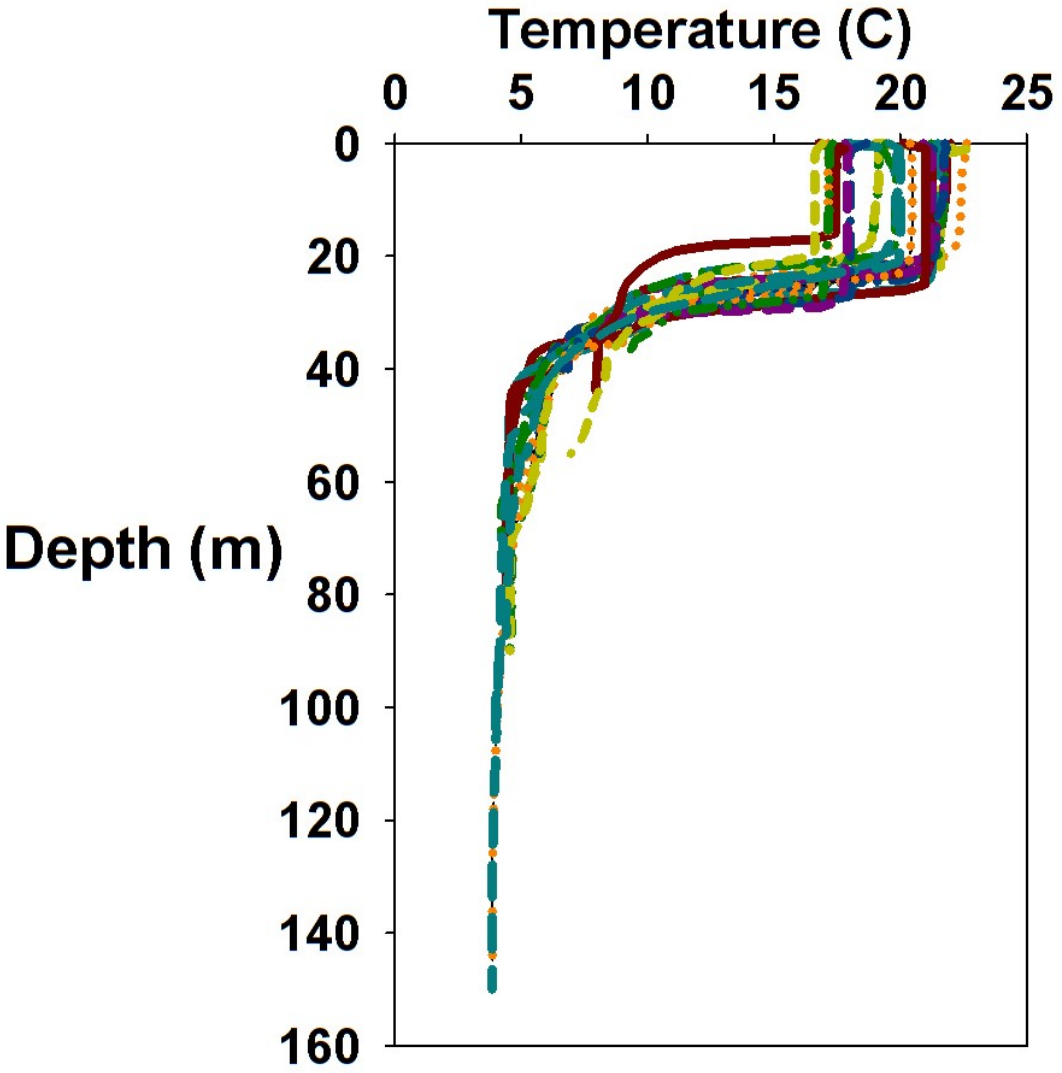
Acoustic transects
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX,


Acoustic transects
Trawls
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX,

Lake thermal structure

Surface temperatures remained warm, mean 20^{o} C during survey period



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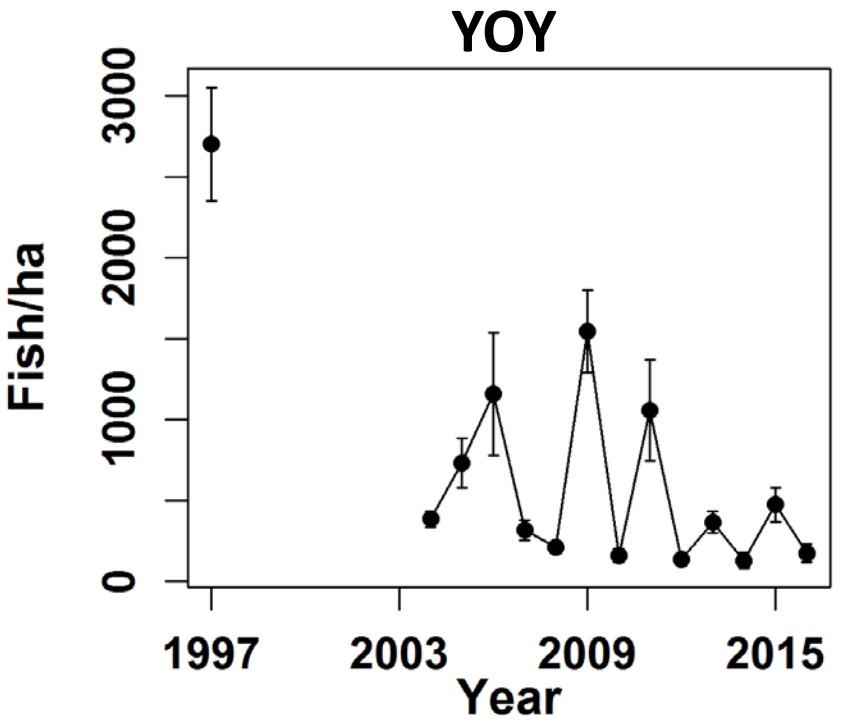
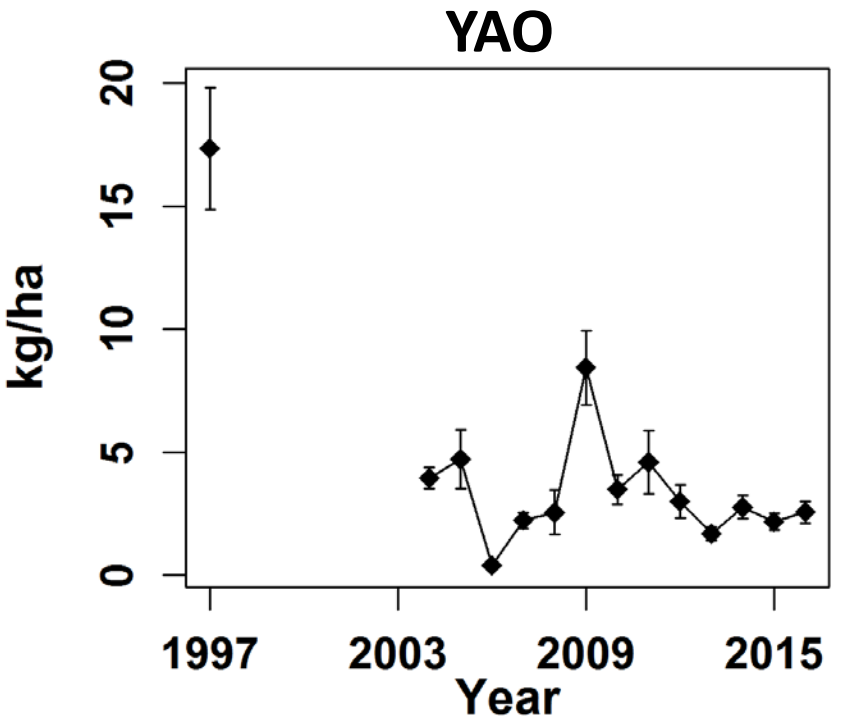
Rainbow smelt - low number of recruits produced, YAO biomass stable





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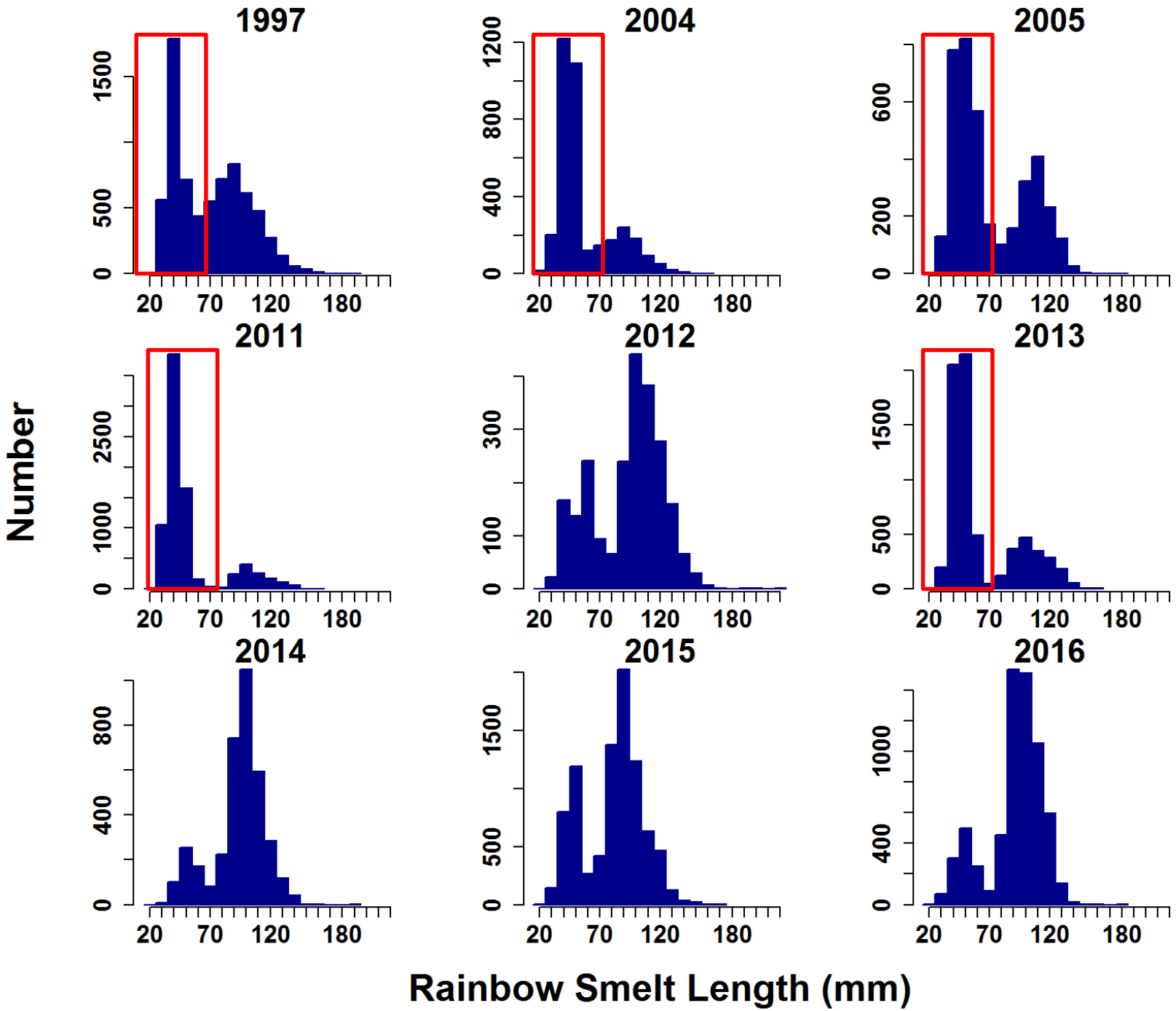
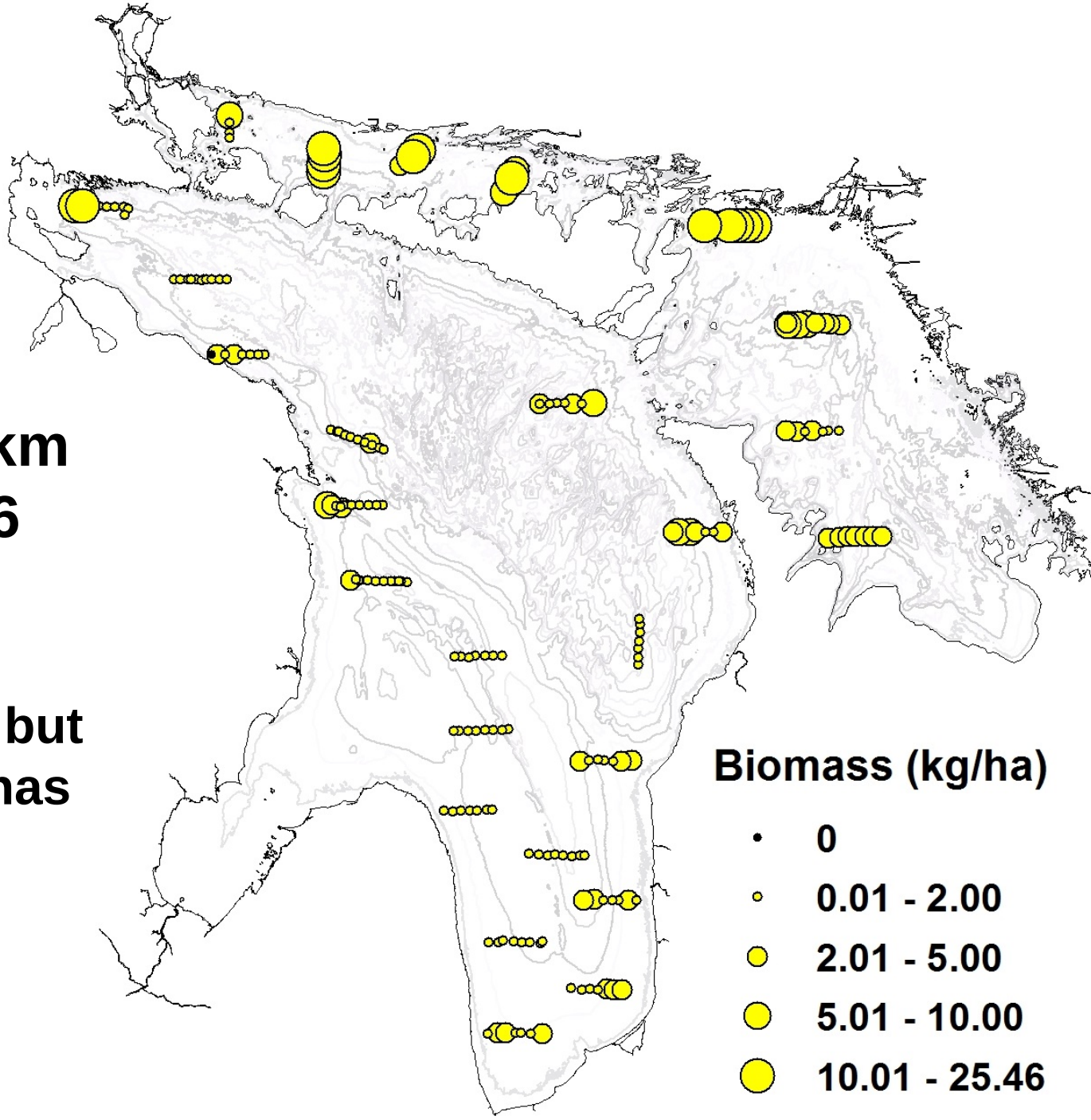

1997
2004
2005
2011
2012
2013
2014
2015
2016
Number
Rainbow Smelt Length (mm)

Distribution of rainbow smelt biomass by 3 km intervals - 2016

YAO widespread but northern region has largest biomass



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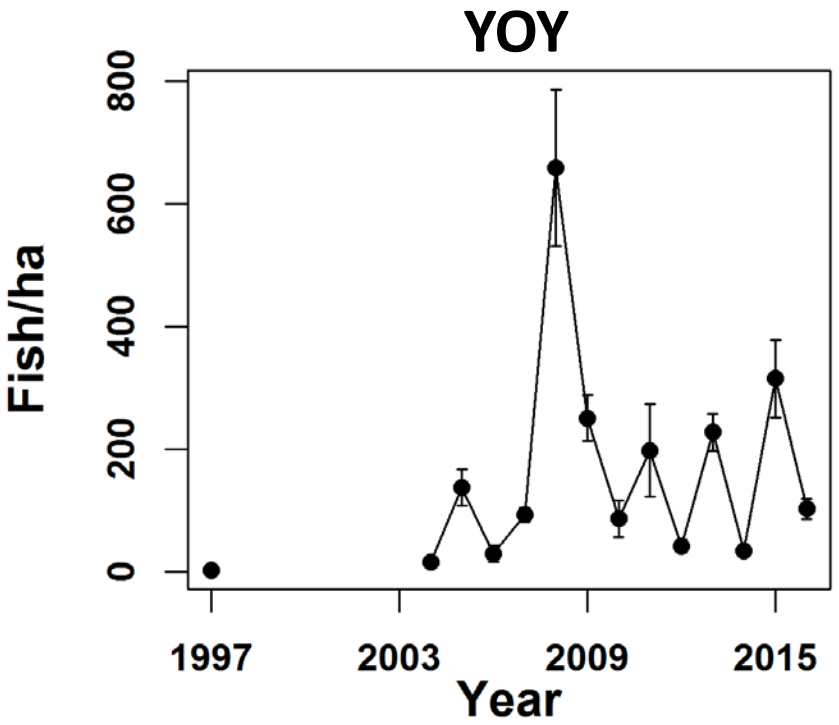
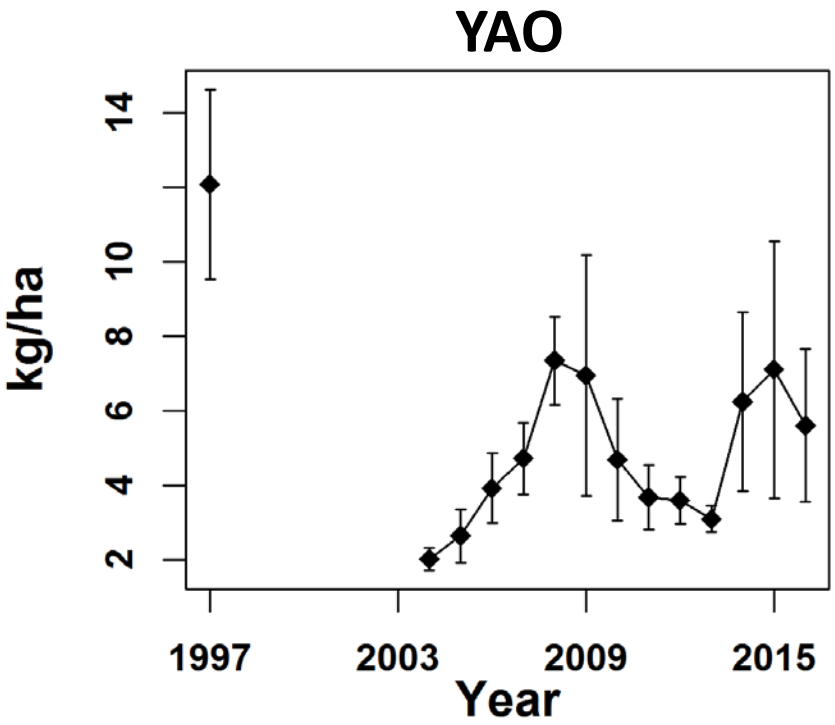
Deepwater cisco (a.k.a. bloater) – low number of recruits, lower adult biomass





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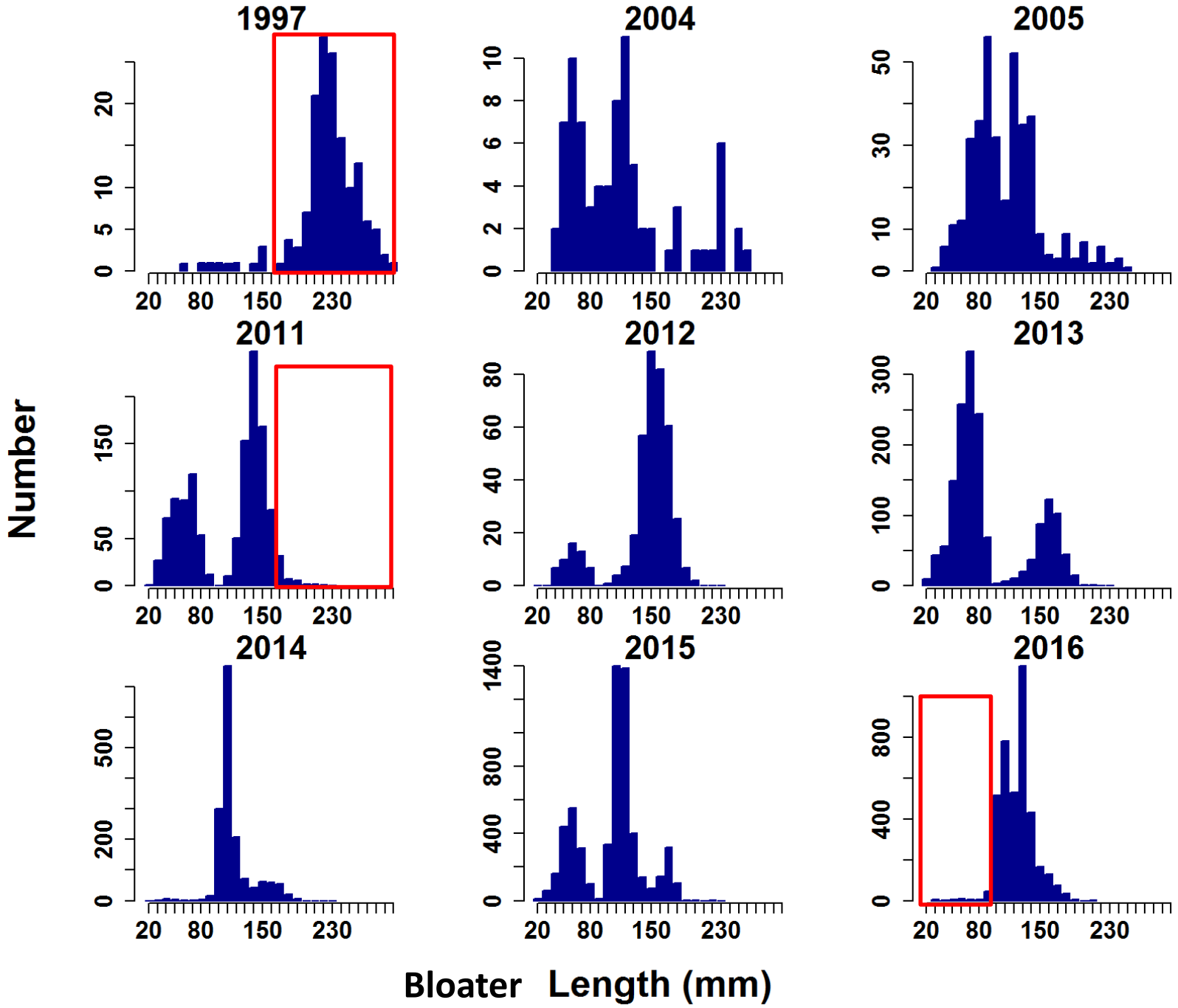
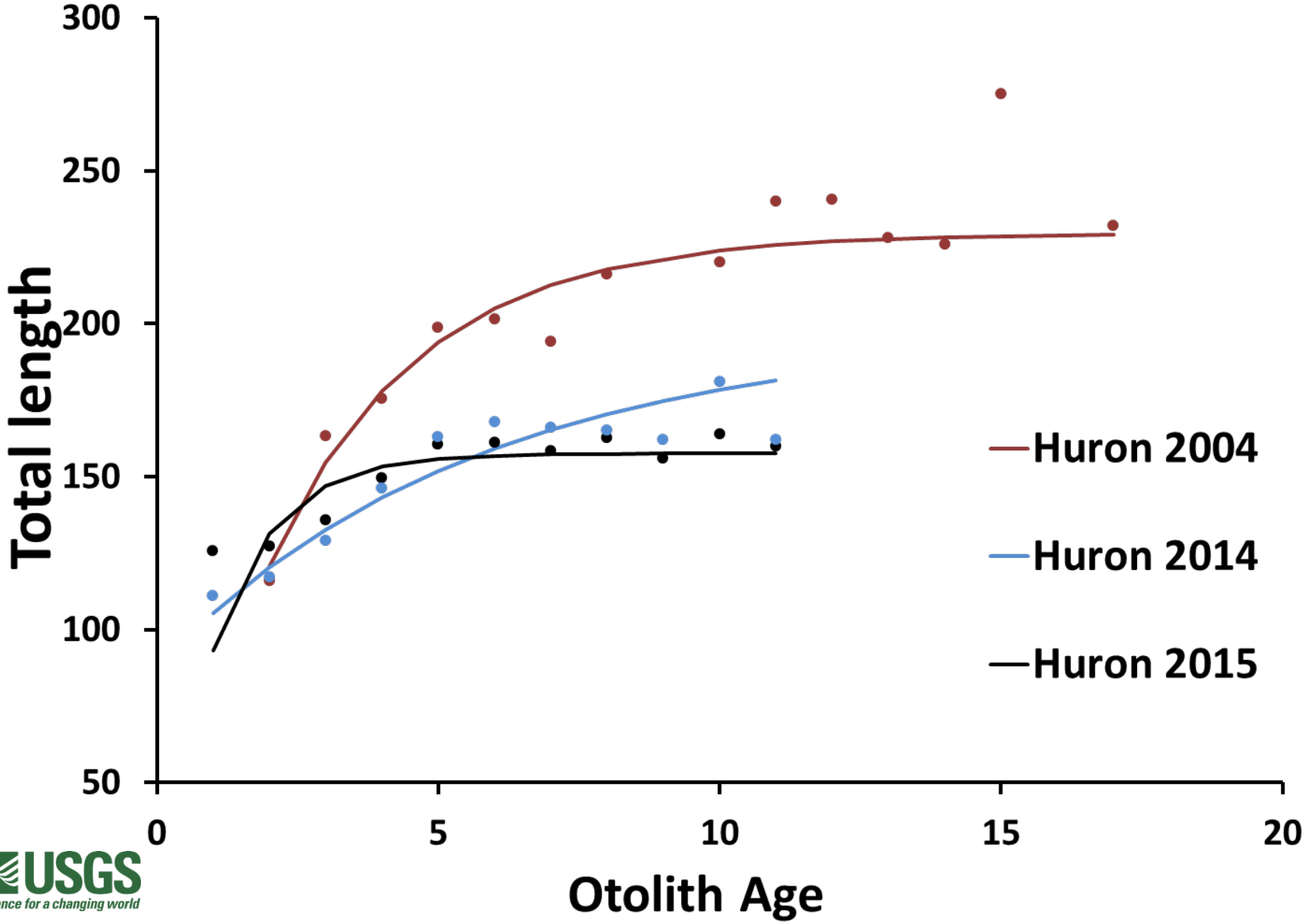

1997
2004
2005
2011
2012
2013
2014
2015
2016
Number
Bloater Length (mm)
20
80
150
230

Reduced bloater length-at-age



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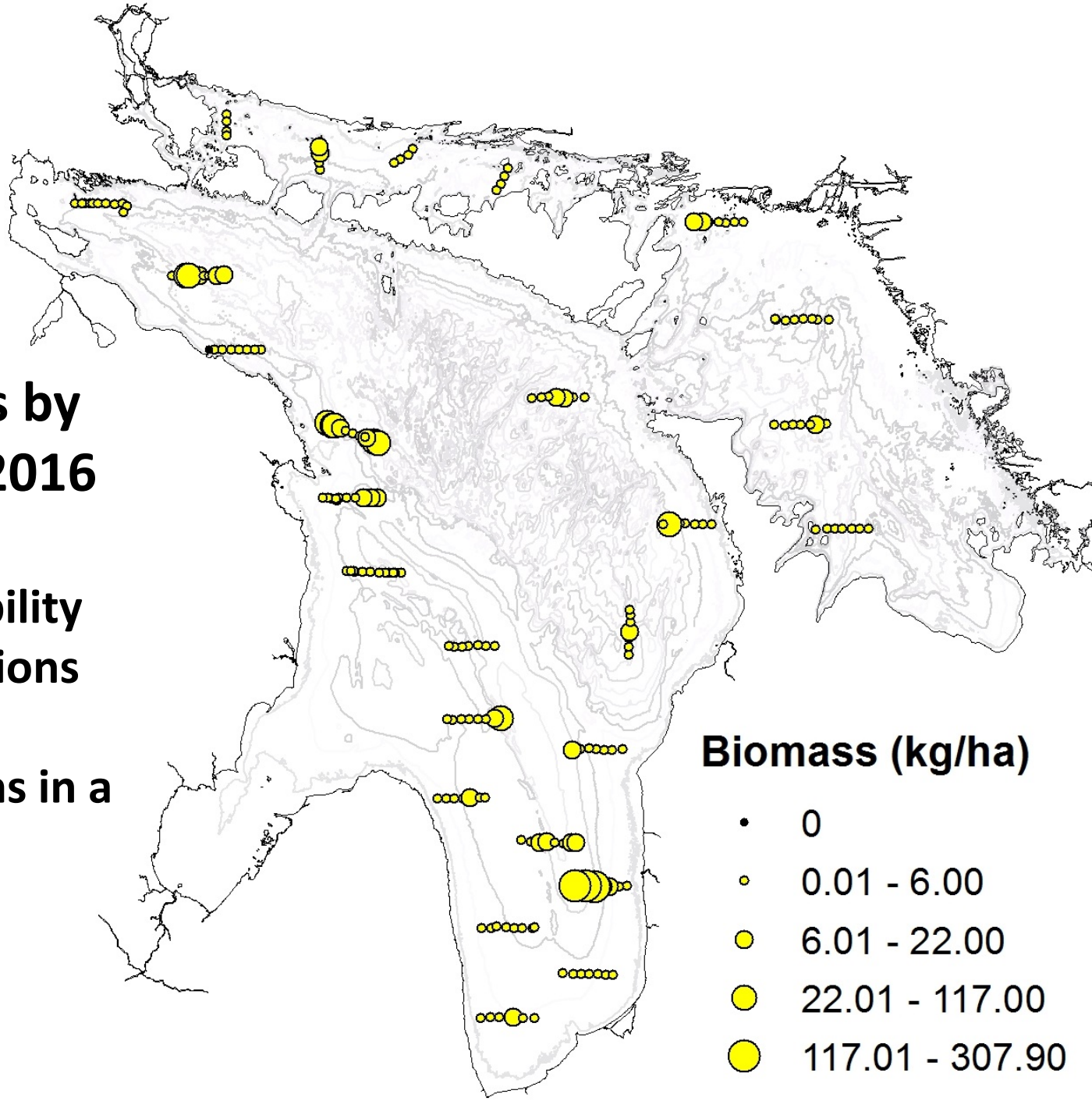
Distribution of bloater biomass by 3 km intervals-2016

High spatial variability in bloater populations

Dense aggregations in a few areas



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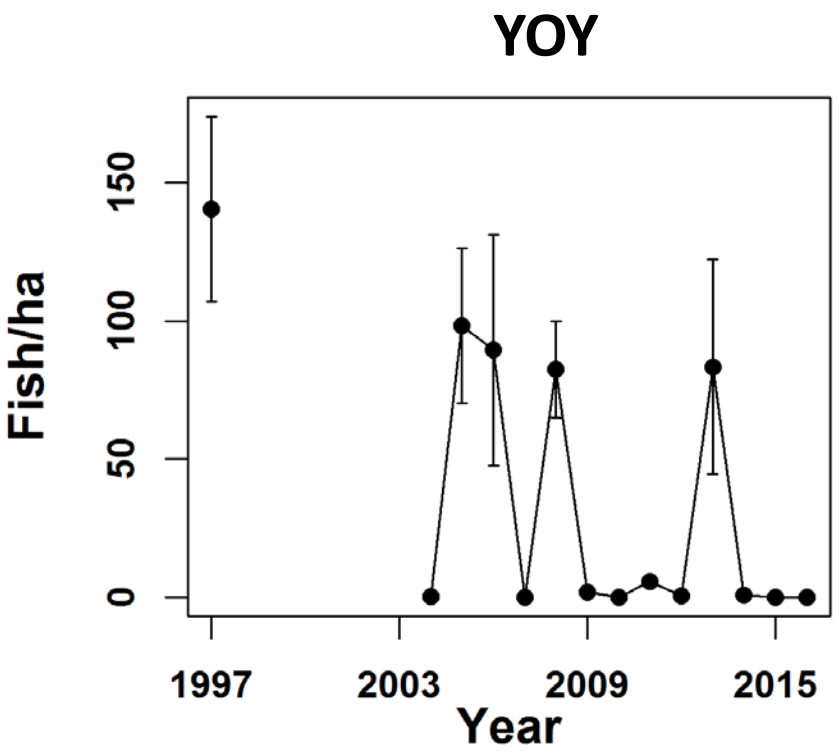
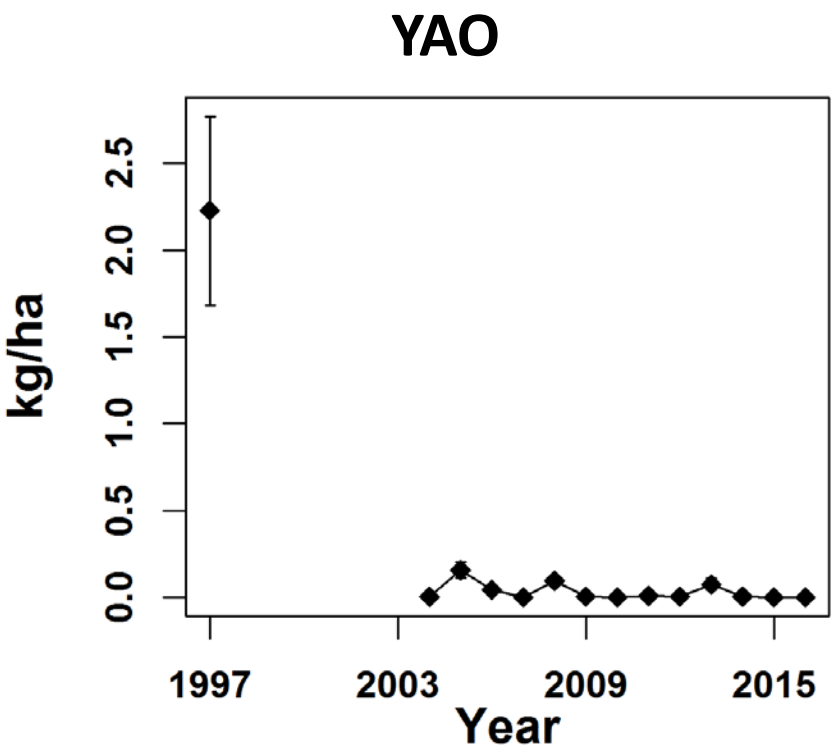
No alewife caught in 2016





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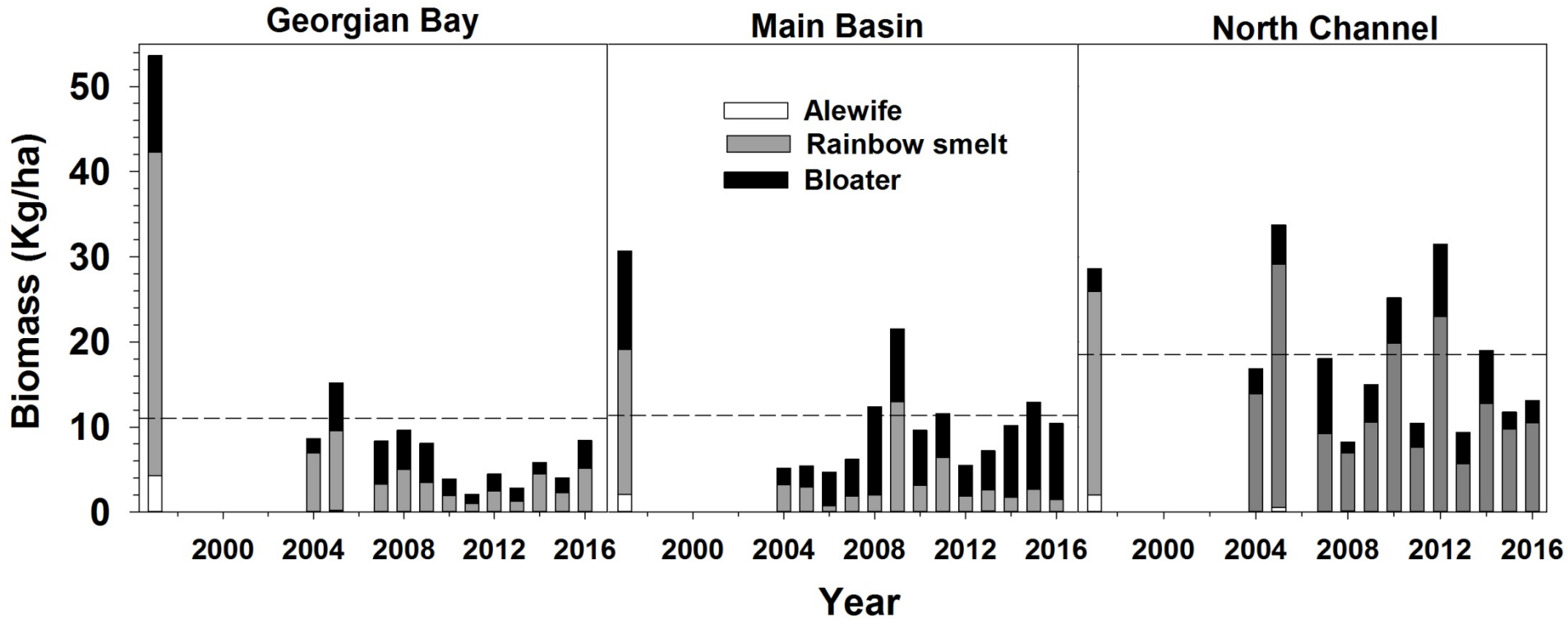
Cross-basin biomass trends

Georgian Bay: two-fold increase (4.1 to 8.5 kg/ha)

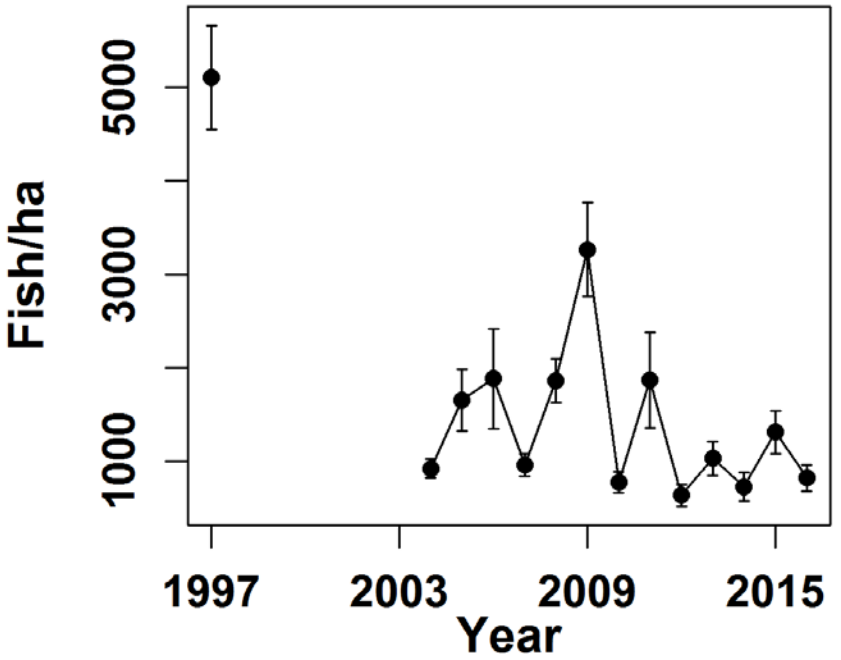
Main Basin: decline (13 to 10.4 kg/ha)

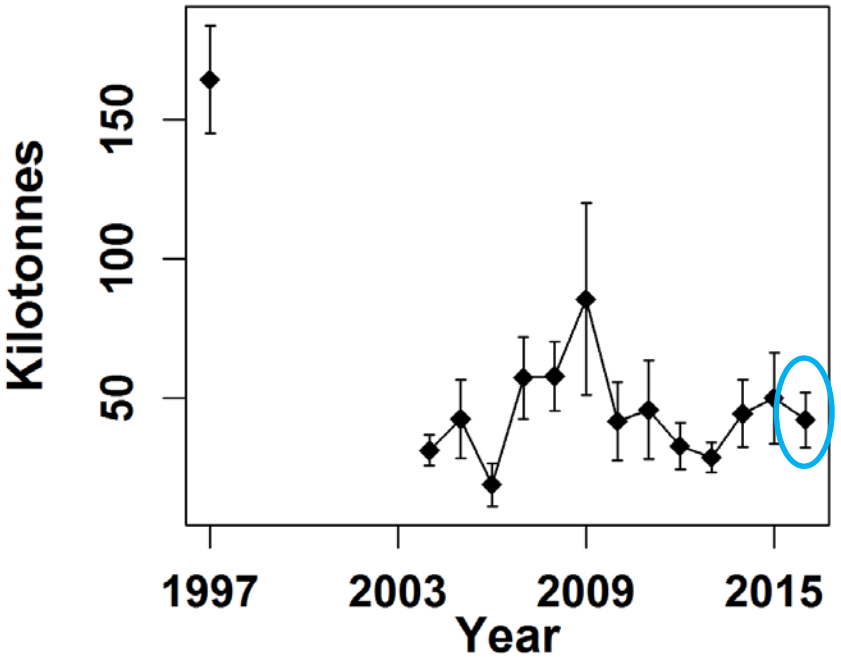
North Channel: increase (12 to 13.3 kg/ha)



Lake-wide density: declined from 1,313 to 824 fish/ha (4th lowest)

Lake-wide biomass: declined from 10.7 to 9.0 kg/ha (SE 2.1) or 42 kt (SE 9.8)





→ 68% bloater, 31% smelt , 1% other

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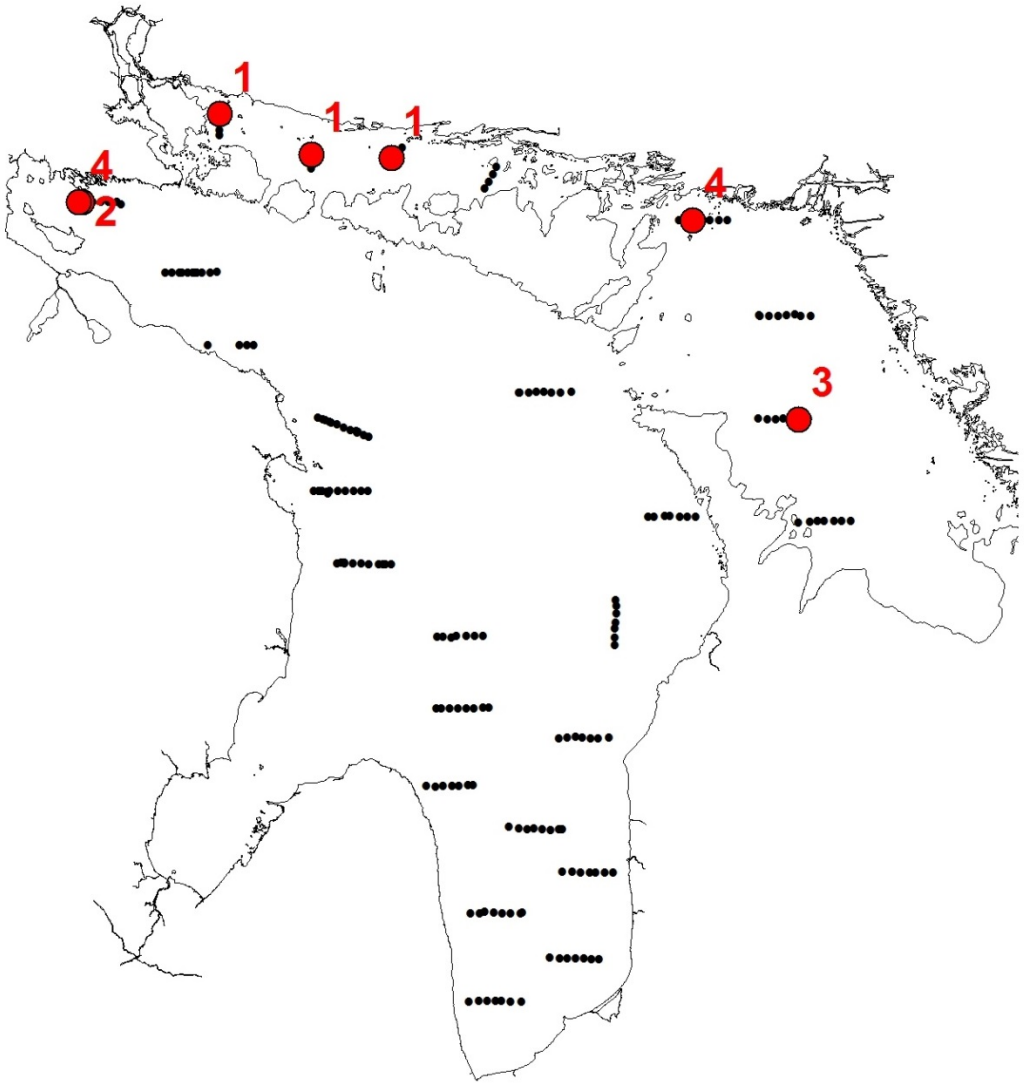
Coregonus artedi

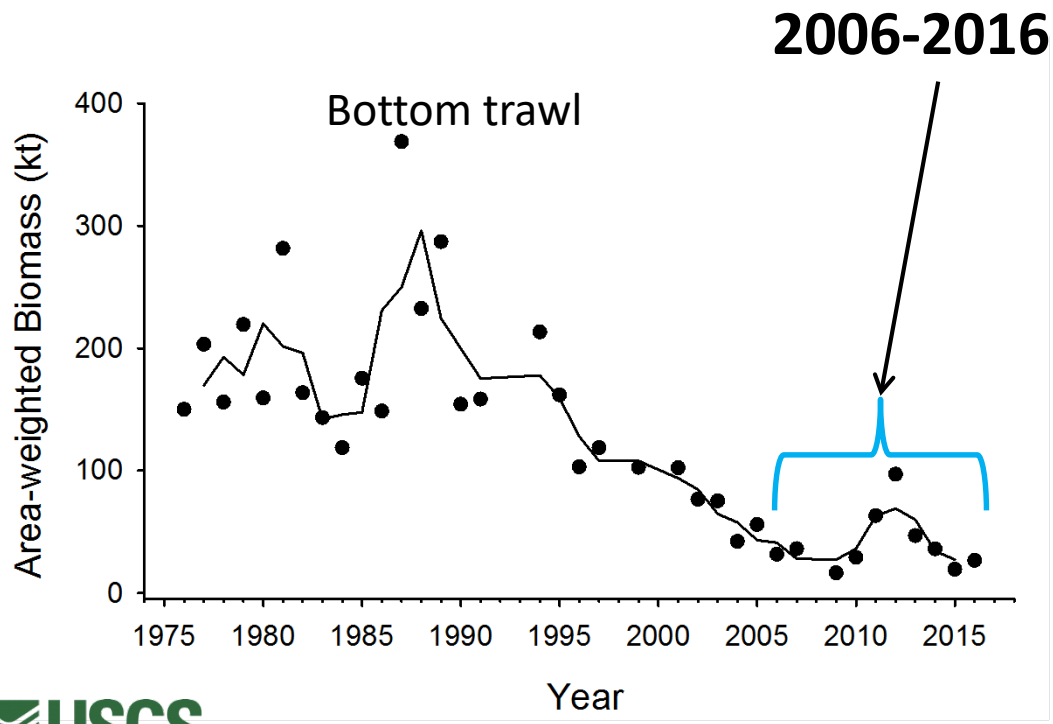
- 16 cisco >300 mm
- Mean capture depth 19.5m
- Bottom depth range: 20-90 m
- Mean capture temp.: 17°C

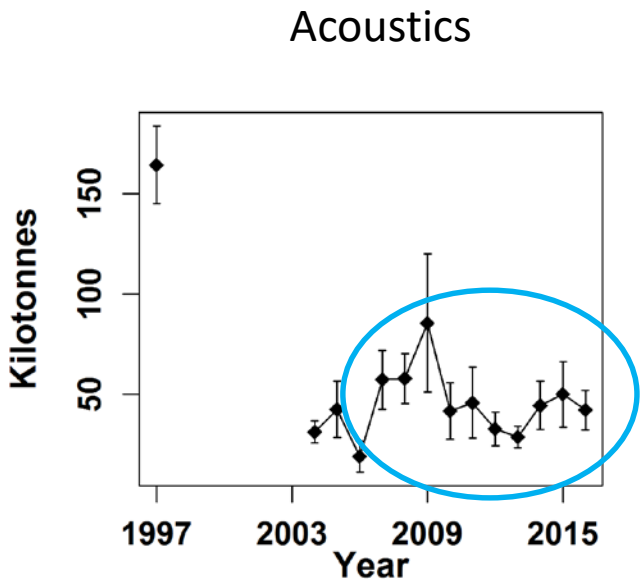
Credit: Chris Olds USFWS



Trends

- total prey fish biomass stable over the past decade, but low relative to 1975-1995 levels





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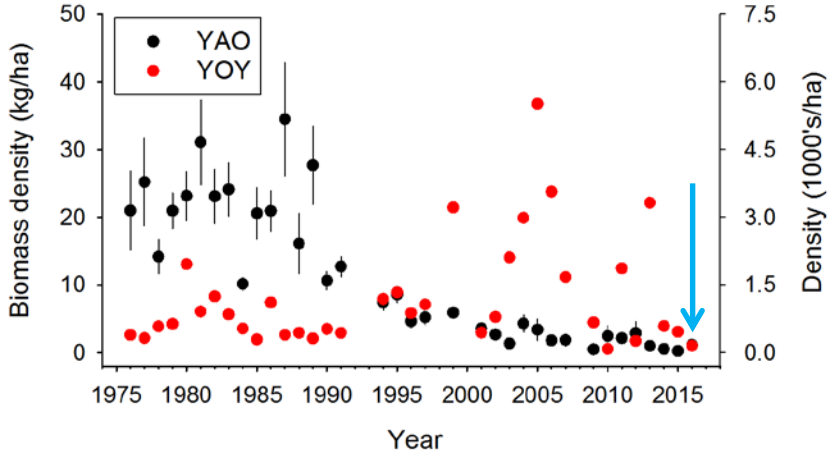
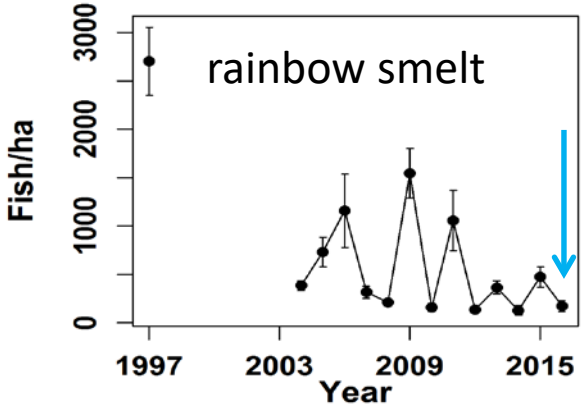
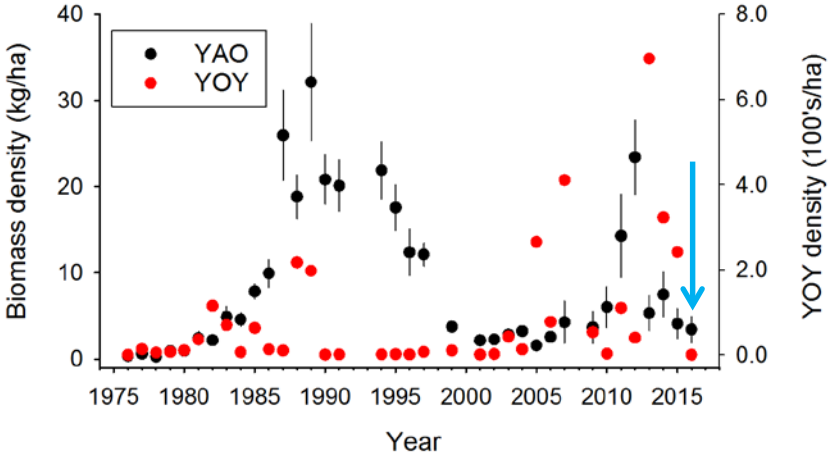
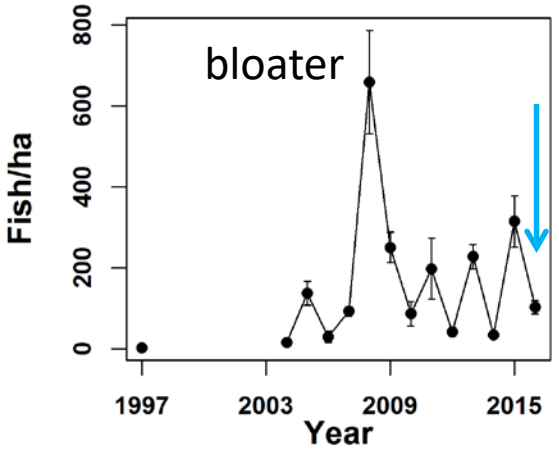
Trends

- weak year classes for ALE, BLO, RBS in 2016



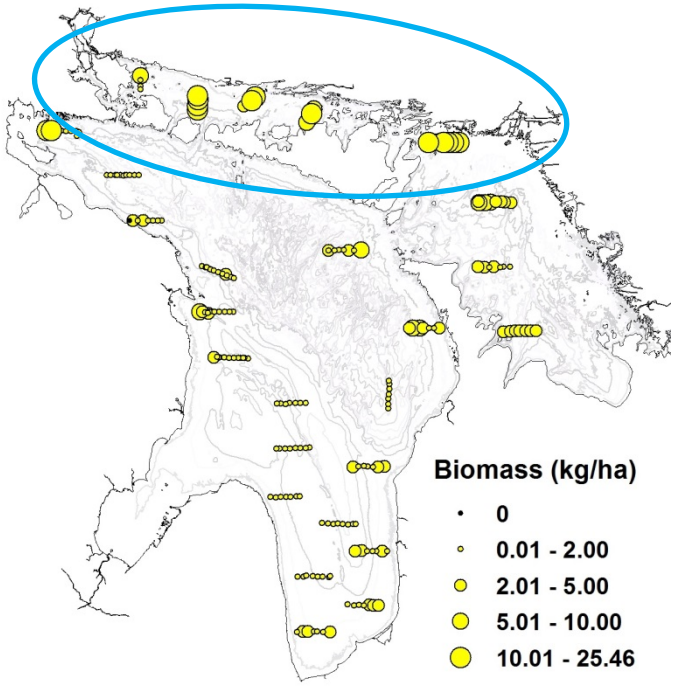




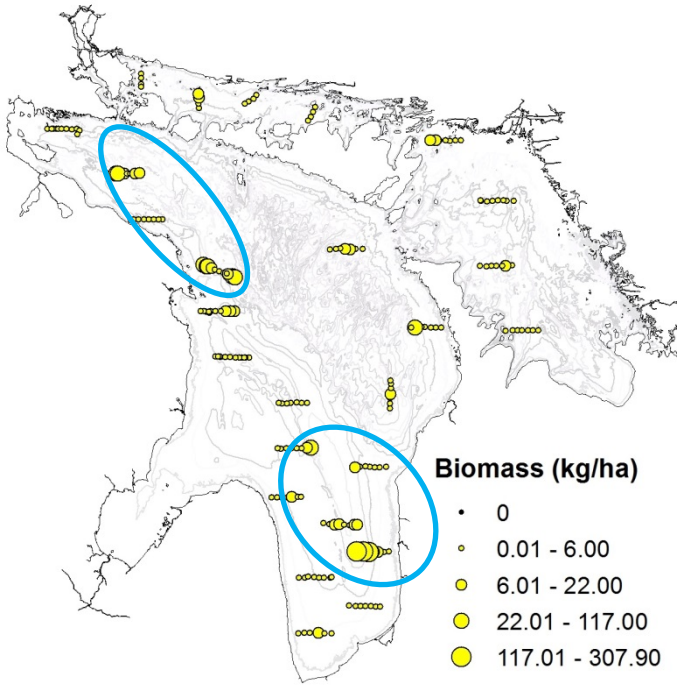


Trends

- High spatial variability in biomass (acoustics)



Rainbow smelt



Bloater

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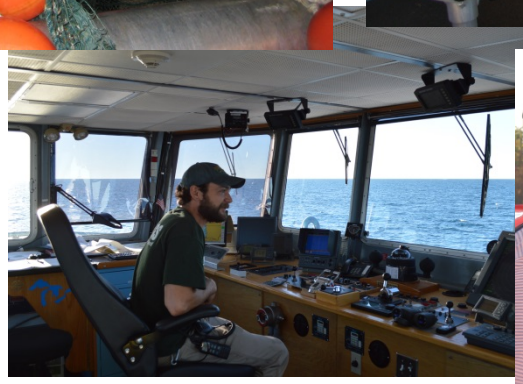
Acknowledgements

Questions?

R/V Sturgeon, R/V Arcticus, and M/V Spencer Baird crews
Database support - Limei Zhang, Scott Nelson



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